BRITISH LICHENS

W. MUDD.

RB62491

Library
of the
University of Toronto

No copy of this in W & W cats 1957-1967.
Bought in Guernsey 1957.

Mrs W. T. Collings —
January 29th 1862.

Som. Ter.
Guernsey.

A MANUAL

OF

BRITISH LICHENS,

CONTAINING

DESCRIPTIONS OF ALL THE SPECIES AND
VARIETIES,

AND

FIVE PLATES, WITH FIGURES OF THE SPORES OF ONE
HUNDRED AND THIRTY SPECIES, ILLUSTRATIVE
OF THE GENERA.

BY WILLIAM MUDD.

PRINTED FOR THE AUTHOR BY HARRISON PENNEY, PREBEND ROW,
DARLINGTON.
1861.

PREFACE.

Few classes of plants have had less attention paid to them, than the one which forms the subject of the present volume. With the exception of a small "Popular History" by "Dr. Lindsay," I am not aware that any single work, containing a full description of the whole of our native species has been published for upwards of half a century; true, during that period a few *monographs* and *papers* on isolated *families* and *genera* have been issued from the press, which have in some measure had the effect of keeping the class from sinking into oblivion, and the spark of interest, attached to it, from dying completely out. The object of the present volume is an endeavour to rekindle still more that spark, and if possible fan it into a flame.

The apathy towards the class cannot arise from any lack of external beauty of the species, internal elegance of their different parts, nor deficiency of stimulative attraction during the process of dissection and examination, as these are all supplied in sufficient abundance to satisfy, not only the most ardent lover of Natural History, but also to excite a thirst in the breast of the most indigent. Neither can it arise from any difficulty in preserving the species when gathered, nor originate from a supposed absence of representatives in certain districts, as a number sufficiently ample to render its study attractive and interesting, may, if looked for, always be found.

Undoubtedly one great drawback and hindrance to the study of this class of plants originates from a feeling, which is common among cryptogamic botanists, that its correct study is difficult and perplexing, and that the limits of its genera are ill defined, and are not characterised by features so manifest as to render the species assignable with tolerable ease to their proper genus. Another cause has originated from the want of a work, complete in itself, containing a full description of all the native species, and their classification simplified; and another from not obtaining a sufficiently powerful microscope, by which to examine them.

Now these hindrances and obstacles it is, and has been, throughout the whole of my labours, my earnest wish to remove, as I feel satisfied that until they are so, the study of this class will never become a popular one with botanists.

As to its study being difficult and perplexing, I do not think it more so than any other class. Those who earnestly desire knowledge, walk boldly up to the difficulties which are strewed in the path thereto, grasp them with a firm hand, and examine with unflagging zeal their formidable appearance, and so one by one their intricacies are unravelled, their towering heads crumbled down, and victory obtained.

Were I asked the question, by one who desired to study this class of plants, which is the readiest method of obtaining a thorough knowledge of them? I would reply, in the first place master the technicalities and phraseology employed in their classification and description, as until this is done no proficiency, approaching to correctness, can be attained; but when once a thorough knowledge of these has been acquired, one half the difficulties will have vanished. Next examine the system of classification and note well the principal characters on which the tribes, subtribes, and genera are based, and then proceed to collect the different species nearest home, and examine each separately. In these examinations note the character of the *thallus* first, and observe whether it is foliaceous or fruticulose, squamulose or crustaceous; this point ascertained, next look for the *apothecia* and see their outward form, which, together with the character of the thallus, will always give the tribe and subtribe to which the species belong. Afterwards one, two, or more of the apothecia should be carefully dissected, and each part of which they are composed examined beneath the microscope; the characters thus seen will invariably point out the proper genus, and this once determined, take the characters of the whole plant, and compare them with the descriptions of each species in the genus to which it belongs, and by so doing the name of the species will be obtained with ease. I would also recommend in all cases a search for the *spermogones*, as I have recently found them, in several instances, to be of much specific importance. They ought to be examined in the same manner as the apothecia.

Dissection, however, is at times tedious work, and nice sections are not always attainable with that ease which many individuals desire; but, nevertheless, it must not be shrunk from on that account. The student must ever remember that *practice* is the most direct road to *perfection.*

Now were these simple directions, or others of a similar nature, adopted, I am certain we should hear no more about the difficuties and perplexities of the study of this interesting portion of the Vegetable Kingdom, and instead of their study being regarded as a task, it would be looked on as a pleasure.

As regards the want of a work on our native species, complete in itself, and containing a description of all the species and varieties known to occur; it is hoped that the present volume will in some measure meet that requirement. Having myself long felt the want, and remembering the shrewd advice of a celebrated author, "never write a book unless we have found the want of such a one ourselves," I acted on the maxim. It was not, however, my intention on its first commencement to publish my observations in the present form, and it was only at the instigation, and by the promise of support and assistance of numerous friends, that I was induced to undertake its publication. Knowing the divided opinion which has existed for the last eight or ten years on the Continent, and also in our own country, among many of the most scientific Lichenologists, respecting their classification and nomenclature, I felt somewhat loth to enter into the field of contention; but having already stated, pretty freely in another chapter, my views on these matters, I need not recur to them here. At the same time, in now handing my work to the reader, I wish to say that, whatever changes, either in the classification or nomenclature, he may meet with, has not been made nor adopted without the fullest conviction that such changes were absolutely necessary, and in now looking over the pages of the volume, I see nothing, (with the exception of a few typographical errors,) that I could wish had been otherwise.

Perhaps I ought to remark, that the whole of the figures of the spores, are drawn to the same scale, with the exception of those marked $\frac{1}{16}$, which is to indicate that they have been reduced one half. In calculating the measurements of the spores of each species, ·001 is equal to a 1000th part of an inch when unmagnified, and to $\frac{1}{8}$ of an inch when magnified. In all cases they have been measured with an eye-piece micrometer. Respecting the price of microscopes, I presume I need not refer to that matter, as advertisements of them are now so numerous, that all may readily obtain the requisite information, both as to their price and magnifying power.

Probably it may be observed, that I have said nothing throughout the whole of the volume, respecting the *use* and *geographical distribution* of the species. These have been purposely omitted, as they will more properly form the subject of a separate work.

My pleasing duty now is a rememberance of those kind friends, who have aided me with specimens of many of the most critical species, and otherwise rendered me valuable assistance. To the Rev. W. A. Leighton, of Luciefelde; to the Rev. T. Salwey, of Worthing; to Professor Dickie, Aberdeen; to Rear Admiral Jones, Dublin; to Dr. W. L. Lindsay, Perth; to Dr. A. C. Maingay, late of Ardglass; to Dr. B. Carrington, Yeadon; to Dr. Windsor, Manchester; to Miss M. Atwood, Bath; to I. Carroll, Esq., Cork; to I. Brown, Esq., Ackworth; I. G. Baker, Esq., Thirsk; to D. Moore, Esq., Dublin; to R. Dixon, Esq., Great Ayton; to my long tried friend G. Dixon, Esq., and to the whole of the subscribers, I beg to tender my sincere thanks, and I earnestly wish that each may enjoy a similar amount of pleasure, in proportion to their studies, while collecting and examining the diminutive plants here described as I have done during the preparation of this work.

WILLIAM MUDD.

Great Ayton, near Stokesley, Yorkshire,
8th, 5th Mo., 1861.

NOTICE.

A few illustrative sets of specimens of 301 species, in *three Fasciculi*, of the species described in this work have been prepared, and may be had for £1 : 14 : 6, or together with the *Manual*, for £2 : 10 : 0. All Orders to be addressed *W. Mudd, Great Ayton, near Stokesley, Yorkshire.*

SUBSCRIBERS.

Atwood, Miss M. 3, Victoria Place, Bath.
Babington, C. C., M.A., F.R.S., F.L.S., F.G.S., &c., St. John's College, Cambridge.
Babington, Rev. C., B.D., F.L.S., St. John's College, Cambridge.
Baker, I. G., Esq., Curator of the Botanical Exchange Club, Thirsk.
Borrer, W., Esq., F.R.S., F.L.S., Henfield, Sussex.
Brown, I., Esq., Flounders Institute, Ackworth.
Carrington, B., M.D., F.L.S., Yeadon, Leeds.
Carroll, I., Esq., 94, South Mall, Cork.
Clark, C., Esq., The Hermitage, Thornton Watlass, Bedale.
College, Queen's, Belfast.
Dickie, G., A.M., M.D., Professor of Botany, University of Aberdeen.
Dixon, G., Esq., Great Ayton.
Dixon, R., Esq., Great Ayton.
Edmonds, Miss, 15, Preston Street, Brighton.
Ferguson, D., Esq., Coatham, Redcar.
Graham, T. Esq., Ayton Hall, Great Ayton.
Gray, I. E., Ph. D., F.R.S., F.L.S., F.Z.S., &c., Keeper of the Zoological Collections, British Museum.
Harding, W., Haughton-le-Skerne, Durham.
Hardy, J., Esq., 43, Radnor Street, Hulme, Manchester.
Hutton, T., Esq., Clifton Castle, Bedale.
Hyndman, H., Esq., Shankling, Isle of Wight.
Jerdon, A., Esq., Mossburnford, Jedbrugh, N. B.
Jones, Rear Admiral, T., Harcourt Street, Dublin.
Key, Miss J., Overend House, Cumberland.
Leighton, Rev. W. A., B.A., F.B.S.E. & L., Luciefelde, Shrewsbury.
Leverton, H., Esq., Truro.
Lindsay, W. L., M.D., F.L.S., Pitcullen House, Perth.
Maingay, A. C., M.D., F.B.S.E., 11th Punjaub Native Infantry, Shanghai, China.
Marwood, G., Esq., Busby Hall, Northallerton.
Maulwere, Miss A., The Mall, Armagh.
Meynell, T., Esq., The Fryerage, Yarm.
Moore, D., A.L.S., M.R.I.A., Botanic Gardens, Glasnevin, Dublin.
More, A. G., F.L.S., Vectis Lodge, Bembridge, Isle of Wight.

Mudd, C., Burton House, Masham.
Mudd, I., Burrill, Bedale.
Pease, I., Esq., East Mount, Darlington.
Pease, J., Esq., Southend, Darlington.
Salwey, Rev. T., B.D., Worthing.
Sibbald, T., Nursery and Seedsman, Bishop Auckland, Durham.
Sim, I., 9. Commercial Street, Perth.
Sopwith, T., Esq., 43, Cleveland Square, Hyde Park, London.
Taylor, J., Esq., Allan Vale, Pitmarston.
Varenne, E. G., Esq., Kelvedon, Essex.
Walker, D., M.D., Beaufort Terrace, Seacombe.
Watson, J. W., Esq., Ackworth, Pontefract.
Webb, F. M., Esq., Claughton Village, Birkenhead.
Windsor, J., M.D., F.L.S., 65, Piccadilly, Manchester.

LICHENS.

Cellular perennial plants, vegetating under the influence of moisture, upon rocks and stones, the bark of trees, dead wood and old timber, on mosses, the bare ground, and sometimes upon each other (parasites). They are generally composed of three distinct and principal parts—viz., *thallus,* analogous to leaves, stem, &c., in the higher classes,—*apothecia,* sporiferous reproductive fruits,—*spermogones,* minute fruits containing spermatia, representing, it is presumed, male organs of reproduction.

1st. THALLUS.

§ EXTERNAL ASPECT AND SUBSTANCE.

The thallus is exceedingly variable in its outward form, and is presented to the eye under a great variety of aspects, on account of which, Lichenists have been induced to designate the most prominent and general forms which it assumes, under a variety of terms, which, when once understood, materially aid in the identification of genera and species.

The terms usually employed are:—

1st. *The foliaceous thallus.* This is, in my opinion, the highest development of thallus that Lichens are capable of attaining. As a general rule, this form may be said to commence from a given point, to expand gradually on every side, and to spread more or less loosely in a horizontal direction over the basis of attachment; it is usually cut, divided, or torn (*lacerated*) in a regular or irregular manner, into lobes of various dimensions, according to the nature of the species to which it belongs. These lobes sometimes become again subdivided into smaller lobes (*lobules, laciniæ*), which generally overlap each other (*imbricated*) to a greater or less extent, the thallus altogether forming a patch, from an inch to several feet in diameter. In our subalpine ravines and dells, it is no uncommon sight to see the trunks of trees, the face of rocks, and large stones, over-run and completely covered with species possessing a foliaceous thallus—*Sticta pulmonacea, S. herbacea,* and *Parmelia saxatilis,* may be quoted as examples.

In substance, this form is usually described as *coriaceous,* when the lobes are of a thick leathery consistency, as in some *Peltigeræ, Stictæ,* &c.—*cartilaginous,* when of a thin, horny or skinny consistency, as in several *Parmeliæ, Squamariæ,* &c.—*membranaceous,* when of a thin, membranous or papery texture, as in several species of *Parmelia,* &c., and *gelatinous,* when composed of a soft substance like gelatine, as in several species of *Collema.* To these definitions I ought to add, that it is frequently necessary to unite two of these terms, to convey a clear and accurate notion of what is meant: for instance, to call a thallus *coriaceo-cartilaginous*, implies that it is intermediate in texture between the decidedly marked coriaceous and cartilaginous forms.

2nd. *The fruticulose thallus.* This form (from which the filamentose, pendulous, and sarmentose, are degenerations) is affixed to the basis of attachment by a central point; it assumes a more or less erect position, and becomes divided, either at its base or a little above it, into branches, which are rounded (*cylindrical*), or flat (*compressed*), naked, or more or less clothed with little leafy scales (*squamules*), or with granular excrescences. The main branches often become again and again divided into smaller ones (*ramuli*), which spread in various directions, and when full-grown, form minute shrubby-looking plants, *e.g. Usnea barbata, var. florida, Alectoria bicolor*, several *Cladoniæ*, &c. I must not, however, pass over the deviations from the above definitions, without first remarking that it sometimes happens, that the thallus although originally erect, becomes, through the elongation or delicacy of its parts, *pendulous*, as in *Usnea barbata, var. plicata*, &c., or *procumbent*, as in *Alectoria jubata, var. chalybeiformis*, &c. Sometimes it consists of an elongated, simple, or branched hollow stem (*podetium*), which is either attenuated into a more or less acute point, or dilated into a tube or cup (*scyphus*) of various dimensions, as in several species of *Cladoniæ, Thamnolia vermicularis*, &c.

This form is generally similar to the last in substance, but less liable to become *gelatinous*.

3rd. *The crustaceous thallus.* This form, numerically speaking, preponderates to a considerable extent over the others. Previous Lichenists have usually divided it, on account of its extreme variableness, into the following subdivisions, all of which I retain :—*Squamulose thallus, Squamuloso-radiated thallus, Granuloso-crustaceous thallus*, and *Pulverulent thallus*.

Subdivision 1. *Squamulose thallus.*—Generally speaking, this consists of small, distinct, and separated scales, either affixed to the basis of attachment by a portion of the lower margin and underside, the upper margin being free and erect, or ascendant; or, by a somewhat central point, the circumference being free, and spreading horizontally; or adherent by the whole of their under side. The general outline is usually either rounded (*orbicular*), kidney-shaped (*reniform*), or angular; and the scales are either loosely congregated together, and somewhat imbricated, or densely aggregated into a compact crust, *e.g. Pannaria brunnea, Psora ostreata*, &c.

Subdivision 2. *Squamuloso-radiated thallus.*—A term applied to that form which commences at a given point, and then expands in a circular manner, the circumferencial squamules becoming dilated, plaited (*plicate*), and lobed; whilst those of the centre retain their original figure, or become partially lobed and imbricated. It adheres, in a few species, by a portion of its under surface, but more frequently by the whole of it, *e.g. Pannaria rubiginosa, Squamaria cartilaginea, S. saxicola*, &c.

In substance, the two preceding forms are generally cartilaginous, membranaceous, or cartilagineo-membranaceous, rarely coriaceous or gelatinous.

Subdivision 3. *Granuloso-crustaceous thallus.*—This form is much more frequent than any of the others, occurring in a large number of species. As a brief outline of its character, I may say that it consists either of disconnected grains, scattered without order, or of minute particles cemented together into a compact crust of a determinate or indeterminate figure. It adheres by the whole of its under surface to the basis of attachment, the upper surface being either rough or smooth, dull or polished, or somewhat shining, according to the nature of the species. When cemented together into a compact crust, and retaining that form, it is said to be *contiguous;* when cracked, or otherwise separated, *rimose, rimoso-areolate,* or *diffracto-areolate ;* and when it occurs in simple, scattered grains or particles, through all its stages, *granular, areolato-granulose,* or *granuloso-crustaceous, e.g. Lecanora, Lecidea,* &c. The texture is described as *tartareous,* when composed of cretaceous elements, and of a thick or thickish consistency ; *cartilaginous* or *membranaceous* when thinner or filmy.

Subdivision 4. *Pulverulent thallus.*—For the most part, this is a degenerated state of the preceding, in which the cortical stratum is altogether wanting, or becomes dissolved into exceedingly minute particles, *e.g. Biatorina pulverea, Bacidia incompta,* &c.

Some authors of recent date have added a fifth form, "*hypophleoid thallus,*" to denote the extremely thin filmy thallus of a few species of *Arthonia,* and several *Arthopyreniæ.*

Certain species possess no thallus of their own (*species athalline*), but appropriate that of others vegetating upon it, and are, in fact, *parasites.* Although somewhat limited as regards number, and insignificant in their appearance, they form a distinct and interesting section, *e.g. Lecidea vitellinaria,* which occurs upon the thallus of Callopisma vitellinum, *Acolium stigonellum, Sphinctrina turbinata,* and *Dactylospora inspersa,* which grow upon those of Pertusaria communis and P. fallax; *Microthelia calcaricola,* and *Thelidium aggregatum,* upon that of Aspicilia calcarea ; *Thelidium epipolytropum,* upon that of Lecanora polytropa ; and *Microthelia rimosicola,* upon that of Diplotomma calcareum, &c.

Before concluding the present section, I ought to say that it is by no means a difficult task to point out species, the thallus of which, from a variety of causes, passes, as it were, in gradual transition from one form to another. Thus the *fruticulose* sometimes becomes converted to *foliaceous;* the *foliaceous* into the *squamulose* and *squamuloso-radiated;* and the *squamulose* into the crustaceous, *e.g. Physcia parietina.*

§ § INTERNAL STRUCTURE.

Notwithstanding the extreme variableness of the external aspect of the thallus, its internal anatomic parts, generally speaking, are characterised by a more regular and definite structure. Two tolerably well-defined divisions present themselves to our view, the one having its elements placed in layers or strata, the other having its elements confused or indistinctly stratified. The number of these layers is usually three, sometimes four, and they have been designated—1st, *cortical stratum ;* 2nd, *gonimous* or *gonidiac stratum;* 3rd, *medullary stratum ;* and when present, 4th, *hypothalline stratum.*

Div. 1. *Thallus stratified.*

The *cortical stratum,* as its name implies, is that part of the thallus which occupies the whole of the outer surface of fruticulose Lichens, both the upper and under of several foliaceous and squamulose, but only the upper of crustaceous ones. It generally consists of an uncoloured cellular tissue, which varies in the thickness and size of the cellules, according to the nature of the species. The most superficial part is amorphous and coloured; which is called, by some, epidermis, and by others, epithallus. In some cases, it consists of an expansion of angular cells altogether distinct from the underlying elements, as in *Leptogium*, &c.; in others, of narrow tubular cavities, arranged in an irregular manner longitudinally, as in *Ramalina*, &c.; and, at times, is altogether wanting the upper surface of the thallus then presenting a pulverulent appearance, as in several crustaceous species.

The *gonidiac stratum* is found immediately below the cortical stratum, or between it and the medullary, and consists chiefly of green (when living) cells or granules, either disposed in a tolerably even layer, or in dissociated masses. It is, in general, very easy to distinguish the limits of this layer from the others, by its peculiar green or yellowish-green colour, and, in fact, the green aspect which most Lichens present is owing to the presence of this stratum.

The elements which constitute the *medullary stratum* are of a more variable nature than in the preceding, but from its being always uncoloured, there is no difficulty in distinguishing it. Three forms seem to be worth noticing, viz.: 1st. The *filamentose*, which consists of simple or branched hyaline filaments, in foliaceous species, loosely intersected and entangled; but more or less conglutinated together in the fruticulose, and assuming a longitudinal direction. In *Usnea*, these filaments are very strongly agglutinated together, constituting a kind of axil for sustaining the thallus, and are easily separated from the other strata. In *Stereocaulon*, *Sphærophoron*, &c., they are more entangled, and much less strongly agglutinated together, yet usually can be separated without much difficulty from the other elements. 2nd. The *cretaceous*, a modification, which consists for the most part, of white molecular granules, amongst which may at times be found eight-sided crystals of oxalate of lime. Nearly all the crustaceous Lichens, possessing a tartareous thallus, have this form of the medullary. 3rd. The *cellulose*, which consists of an uncoloured tissue of angular, rounded, or oblong cells, amongst which are sometimes seen scattered gonidiac granules. In some species the cells have a tendency to reunite into filaments, then to separate into rows, and offering some resemblance to the *filamentose medullary*—as *Endocarpon*, some *Pannariæ* and *Verrucariæ*.

The *hypothalline stratum* is the inferior stratum of the thallus, and that over which the others stratify themselves. When present it is readily distinguished by its colour, which is mostly black, dark brown, or pale brown, and sometimes, though rarely, white; but in a great many species it is either invisible or altogether wanting. It usually presents itself under a two-fold aspect, viz.: *Rhizines*, that is to say, the black or brown fibres, which occur on the under side of most foliaceous Lichens. These fibres are often branched, or somewhat tufted at their extremities, and apparently answer the purpose of roots for holding the thallus to the different bodies on which it lives; but it is doubtful whether they contribute anything in the way of nutrition. They either consist of simple or articulated hyaline filaments, cemented together, and coated over with a coloured or partly coloured cellular substance; or of a great number of minute coloured and uncoloured cells, agglutinated together by a hyaline mucilage, *e.g. Parmelia, Borrera,* &c.: or of simple, articulated, pale filaments, as in *Sticta*, &c. *Hypothallus*, a term generally applied to designate a horizontal black, brown, bluish, or white inferior stratum; which either consists of entangled filaments, as in *Pannaria plumbea*, &c., or of elongated or rounded cells more or less mixed with molecular granulations, as in most crustaceous Lichens. In many species this stratum is only represented by a narrow black or brownish line, which constitutes the edge or limit of the thallus.

Div. 2. Thallus indistinctly stratified.

As a general rule, I may here observe, that the elements constituting the thallus of the family *Lichenaceæ* are placed in layers or strata, and in that of *Collemaceæ*, confused or placed without order. To this definition there is, however, a few exceptions in the family *Lichenaceæ:* in some species of the inferior genera, having a pulverulent thallus, the elements are, to a greater or less extent, mingled together; and, in some others, possessing a membranaceous or a thin, filmy thallus, they also seem in some measure blended together, the gonidiac stratum, however, generally remaining distinct, and frequently seen when all the others are absent. In the family *Collemaceæ* the cortical stratum is chiefly represented by a greenish or brown noncellular epithallus, or by a thin stratum of angular cells, altogether distinct from the other elements constituting the thallus of this family. The gonidiac granules are also disposed in a different manner to those of *Lichenaceæ.* In the majority of the species these granules are agglutinated and strung together into lines resembling a necklace (*moniliform-coherent*), and distributed without any particular order, in a gelatinous and perfectly pellucid substance, which absorbs water very readily. In other species of this same family, they are disconnected and dispersed in the middle of the thalline tissue; and, in some others, agglomerated into little groups two to six or more in number, and mostly placed next the epithallus. The medullary elements consist of elongated, tubular, hyaline filaments, or of roundish cavities, containing gonidiac grains, always imbedded in a gelatinous, uncoloured substance. In the little family *Myriangiaceæ*, the thallus is entirely formed of a cellular tissue, and a gelatinous substance.

Independent of the stratified or unstratified nature of the thallus, of the two great families *Lichenaceæ* and *Collemaceæ*, all the species which belong to the last named family, are readily distinguished by their habit, gelatinous nature, deep dull colour of their thallus, and by becoming, on the application of water, distended and swollen to twice or two-and-a-half times their size in a dry state.

§ § § CYPHELLÆ, ISIDIA, SOREDIIFEROUS EXCRESCENCES, ETC.

1. *Cyphellæ.* These are the small yellow, white, or cream-coloured excavations that occur on the under side of the thallus of *Sticta*, the *real* use of which is unknown. Most probably they aid the nutritive functions, which in this genus attain a higher degree of development than any other. The form which the *cyphellæ* assume is generally that of small verrucæ, at first closed, afterwards becoming gradually expanded, and finally urceolate.

2 *Isidia* or *Isidioid.* A particular exuberance of the thallus, con-

sisting of smooth, stipitate, erect excrescences, of the same colour and texture as the normal thallus; in all species producing them, the thallus is generally described as *isidiiferous, e.g. Peltigera canana, β. rufescens, Parmelia olivacea, Pertusaria syncarpa*, &c.

3. *Soredia.* These are the pulverulent eruptions which appear on the thallus of several foliaceous and crustaceous Lichens. In some species they occur only on the margin of the lobes, in others on the disc of the thallus, and in some others, they apparently form a kind of substitute for the apothecia—for example, the thallodal verrucæ of some *Pertusariæ* become transformed into sterile serediiferous excrescences, which probably arises from situation, atmospheric influence, or from the chemical nature of the nidus on which they occur. In form, the *soredia* are generally rounded glomerules, or irregular verrucæ, always more or less prominent, and are usually composed of gonidiac and molecular granules, at times mixed with hyaline filaments; they are most frequently of a white or grayish-white colour. The species producing *soredia* are described as *sorediiferous.*

4. *Variolaria.* Originally adopted as a generic name for certain fertile and sterile crustaceous Lichens, all of which are now found to belong to other genera, as *Pertusaria* and *Phlictis.* The term *variolaria* or variolose being now applied to abortive apothecia transformed into soridia.

5. *Lepraria.* Another generic name, originally used to denote a sterile pulverulent crustaceous thallus, which assumes a variety of forms, of which the fructification has not been detected. There can, however, be little doubt but that the majority of these forms are but incipient states of well established species.

6. *Spiloma.* Also formerly employed to point out certain generally black, pulverulent bodies, which are now and then observed upon the thallus of Lichens, and which originate from the presence of minute parasitic *fungi.* This, with *Lepraria* and *Variolaria*, are now abolished as *genera.*

2ND. APOTHECIA.

§ EXTERNAL ASPECT.

The apothecia are reproductive fruits, generally situated upon the surface of the cortical stratum, or immersed in the tissue of the thallus; they are always developed on that side of it which is turned towards the light, and distinguished from it by being generally of a different colour. They usually appear under two principal forms, either that of a *flattened disc,* as in the *disciform, thalamiferous,* or *gymnocarpous Lichens* (Lichenes Gymnocarpi); or that of a *rounded tubercle,* as in the *verrucæform, nucleiferous* or *angiocarpous Lichens* (Lichenes Angiocarpi.) The apothecia of the first mentioned of these types vary considerably in their formation and outline, and have been subdivided into groups, which are classed under the following terms:—

Peltate or *peltæform.* These are large flattened apothecia, having a somewhat rounded outline but destitute of a *distinct* and *prominent* thallodal margin *(Usnea barbata, &c.)*

Reniform. This is simply a variation of the preceding, in which three sides of the apothecium are rounded, and the other slightly bent inwards, or nearly straight. *(Nephroma lævigatum, &c.)*

Scutelliform. These are orbicular, flattened, slightly concave, or convex apotheca, surrounded by a distinct, and usually prominent, *thallodal margin*: in other words, the receptacle or exciple, in which the thalamium is contained, is formed of the same substance as the thallus, and is of the same colour as the cortical stratum. *(Parmelia, Lecanora, &c.)*

Patellæform. Typically orbicular, flattened, slightly concave, or convex apothecia, surrounded by a distinct, and more or less prominent *proper margin*:—that is to say, the exciple is formed of a distinct substance, and is of a different colour from the thallus. *(Lecidea, &c.)*

Lirellæform. These are of the same construction as the last, but of a different figure, being chiefly linear elongated, simple or branched, straight or flexuose; generally very variable in size, even in the same species, being sometimes reduced to a mere speck, and at others elongated from $\frac{1}{8}$ to $\frac{3}{8}$ of an inch, or more, in length. *(Opegrapha, Graphis, &c.)*

Urceolate. Concave apothecia, surrounded by a more or less prominent *thallodal margin*, a *proper margin*, or by a *compound margin.* This last belongs to those apothecia which are furnished with an internal proper exciple, generally formed from the hypothecium, and which is again itself contained in a thallodal exciple. *(Acarospora, Urceolaria, &c.)*

Maculæform. Immarginate apothecia, more or less dilated into rounded or radiated maculæ of various sizes. *(Arthonia, &c.)*

The *verrucæform* apothecia being less variable, they do not seem to require particular explanation, further than, that the receptacle in which the nucleus is contained has been designated *perithecium*, and is originally and typically closed.

It may perhaps be as well to notice here that the excipulum in which the thalamium is contained, is either immersed in the thallus, or more or less elongated into a stipe; hence the apothecia are sometimes described as being *innate*, (immersed in the thallus), at others *sessile*, (placed on the surface of the thallus without apparent stipe), and at other times *stipitate* (the excipulum lengthened out into a foot-stalk). The verrucæform apothecia occupy similar positions, but are less liable to become stipitate.

The scutelliform, and patellæform apothecia, although described as orbicular opened flattened discs, are not strictly so from their first commencement. In a young state the excipulum is nearly always contracted and drawn up so as to conceal the thalamium, a circumstance which has induced some Lichenists to reject the divisions, "*gymnocarpi*" and "*angiocarpi*," of *Fries*, altogether from their systems. But seeing that the excipulum is only contracted and assumes this sub-globose figure in the very earliest stages of the existence of the apothecia, and is not entirely and permanently covered with it, as in the *angiocarpi*, I retain the terms as being strictly applicable to the fully developed and matured apothecia. It is an extremely rare case to find specimens, in which the whole of the apothecia are in a young state and contracted in this manner, consequently no difficulty need be feared as to the general applicability of these terms. It is also rare to find apothecia of an intermediate form, and although we may occasionally come in contact with species possessing apothecia, which appear to have as much right to be placed in one division as the other, they invariably present other characters which leave no doubt as to their proper position.

A further explanation relative to the patellæform apothecia may not be out of place here. As a general rule, these usually present themselves as plane discs, surrounded by the margin of the proper exciple, but often they become so remarkably swollen and convex, as to entirely obliterate all appearance of this. Other apothecia retain their flattened form, but become variously flexuose and angular, which gives them a sublirellæform, or pseudo-lirellæform, aspect. What I have described in this work as *pseudopatellæform* apothecia, are apparently composed of a number of minute apothecia, which arise from one given point, and in the process of development become closely compressed against each other, and are forced as it were by their growth within the given space, into a spiral or gyrose figure, as exhibited in the genus *Gyrophora*.

§ § INTERNAL STRUCTURE.

The several parts of which an apothecium consists have been designated by various terms, out of which I have adopted and employed the undermentioned in describing the species contained in this work.

A *gymnocarpous*, or disciform apothecium, in a well developed state, is usually composed of an *excipulum*, *hypothecium*, *thalamium*, and *epithecium* or *disc;* an *angiocarpous*, or verrucæform apothecium, of a *perithecium*, and a *nucleus*.

1st. *Excipulum*. The excipulum is that part which forms the border to the thalamium, and, as I have already intimated, in all the scutelliform apothecia, it is constituted of the same elements as the thallus, and is of the same colour. In the patellæform and lirellæform, and some other types of apothecium, it presents itself in the form that is denominated a *proper excipulum*, and usually consists of a very dense cellular tissue; the cells being, for the most part, closely packed and cemented together, very minute, and often rather indistinct, but always of a different colour from the thallus. It is in general presented under two forms—that of a cup (*cupular excipulum*), which encloses both the sides and base of the thalamium,—or that of a simple rim (*annular excipulum*), which is confined to the sides only, the base of the thalamium resting upon the hypothecium, which, in cases where the excipulum is only annular, seems to act as a kind of substitute.

The *hypothecium* generally consists of a rather loose stratification, of small coloured and uncoloured cells, placed at the base of the thalamium. It is liable to considerable variation in its density, being sometimes composed of a stratum of very fine uncoloured or partly coloured cellules, closely packed and cemented together by a gelatinous substance (*hypothecium carnose*); at other times, of a stratum of uncoloured cells, more or less mixed with larger coloured ones, the latter sometimes becoming to a greater or less extent agglomerated (*hypothecium grumous*); while in others it consists of minute cells, mixed with much granular matter, densely packed together, of a reddish or brownish-black colour (*hypothecium carbonaceous*). In species possessing a carnose, or carboanceous cupular excipulum, the hypothecium is usually incorporated with it; in fact, the excipulum then seems to be simply a prolongation of the hypothecium, *e.g.* several *Lecideæ*, *Schismatommæ*, *Opegraphæ*, &c.; in others, having only an annular excipulum, or in those in which the excipulum is altogether wanting, as is sometimes the case (*e.g. Chiodecton*, &c.), each part then performs its own functions, and remains separate, *e.g.* several *Lecideæ*, *Graphis*, &c.

Perithecium. This, in the angiocarpous division, is analogous to the excipulum in the gymnocarpous, and does not differ from it, except in form. It usually constitutes the shell or outer covering of the apothecium, which in general assumes a globular, hemispherical, or hemispherico-convex figure. In a globular or globose apothecium, the perithecium entirely envelopes the nucleus (*perithecium entire*) ; in an hemispherical one, only the upper or exposed part (*perithecium dimidiate*), the base of the nucleus being then enveloped in a thin inner tunic or internal lining of the perithecium ; this internal lining, in the entire perithecia, is not always distinguishable, as it is, to a greater or less extent, incorporated with the perithecium itself, but it is more than probable that it is always present. The apex of the perithecium (usually designated *ostiolum*) is, for the most part, slightly depressed ; it is generally described as being perforated by a simple pore, but this expression is not literally correct, as the minute opening of the ostiolum is invariably at first covered with a thin, gelatinous veil, which protects the nucleus, and prevents the discharge of the spores until they arrive at maturity.

2nd. *Thalamium.* The thalamium comprises the organs of the fruit, and is that part of the apothecium which is contained in the excipulum. It is readily distinguished from both the excipulum and the hypothecium by being composed of different elements, and by their perpendicular position. It usually consists of erect paraphyses and asci, more or less conglutinated together with an amylaceous, mucilaginous, or watery substance, all of which greedily imbibe water.

Nucleus. This differs in nothing from the thalamium, except in the figure and form of the paraphyses, which are most frequently hyaline, and linear throughout.

The *paraphyses* are the fine hyaline filaments, which arise perpendicularly from the hypothecium, and are cemented to its superior face by a great number of very fine cellules. They are in general of an equal height, closely packed together, and usually very slender, but in this respect they are liable to some variation, yet rarely or never exceed ·001 inch in thickness. They also assume different forms, being sometimes of a clavæform figure, at others linear, attenuated into a short pedicle at the base, and somewhat thickened at their apices ; at other times linear, and somewhat articulated ; and at times linear throughout. In general, it is not difficult to perceive that they are hollow, and more or less filled with a mucilaginous, uncoloured substance (*protoplasma*), it being, at times, separated into little globules. Their apices are ordinarily coloured, and cemented together with a sub-gelatinous substance, which, through exposure to the influence of the atmosphere, becomes indurated to a greater or less extent; and which, gradually expanding with the growth of the thalamium, eventually constitutes that part which is commonly called the *disc* (*epithecium*) in the descriptive characters of the species. In some genera, the paraphyses are altogether wanting, their place being supplied by a greater abundance of the mucilaginous or watery substance ; as in *Arthonia*, etc., in the gymnocarpous division, and *Endocarpon*, *Verrucaria*, etc., in the angiocarpous.

The *asci* are large oblong, cylindrical, or clavæform cells or vesicles, designed entirely for holding and maturing the spores; they are usually more or less attenuated towards the base, and fixed to the superior face of the hypothecium in a manner similar to the paraphyses, from which they are always easily distinguished by their larger size and shape; but in this they vary, according to the genera and species to which they belong, and their size depends altogether on the number, size, and respective position of the spores which they contain. Thus, those species producing spherical spores, when eight in number, are generally contained in cylindrical asci, the spores being placed one immediately above the other in a linear series in each ascus (*uniserial*); also in some other species producing elliptical-oblong spores, they are ranged end to end throughout the length of each ascus, as in *Thelidium gemmatum*, and a few other species; but, most frequently, those species producing elliptical or oblong spores are contained in clavæform asci, the largest portion of the spores being congregated at or near the apex of the ascus, and the smallest towards the base of it. In some species, producing very large spores, as in the genera *Pertusaria*, *Phlyctis*, etc., the asci are distended in proportion, and generally assume a saccate or oblongo-ventricose outline. The ascus itself is a thin, membranous cell, the walls of which are, at first, of an equal thickness, but in the process of development the sides become gradually thinner and thinner, while the apex and base retain their original thickness. When the spores are fully matured, the apex becomes ruptured by the external pressure of the paraphyses (caused by the absorption of water into these elements), and thus the spores are ejected to a distance with a greater or less force; but to this there are some exceptions, as in a few species the ascus is formed of an extremely thin membrane, which becomes ruptured at a very early stage, and often nearly all trace of its existence disappears, *e.g.* *Cyphelium*, *Coniocybe*, etc.; whilst again, in some *Lecideæ*, the wall of the ascus is remarkably tough, and is ruptured with greater difficulty, it having, in all probability, to undergo a state of decay, ere the expulsion of the spores take place. In species altogether destitute of paraphyses, the ascus is invariably ruptured by the pressure of the internal spores alone, or by the growth of one ascus against another. The shape and size of the asci, in many species, is very remarkable, and often forms a distinct specific character.

The *spores* are the reproductive organs, and are developed in the interior of the asci in something like the following manner. At first the asci are entirely filled with an organizable fluid, which generally consists of two or three ingredients, viz.: minute molecular granules, a a pale yellow oily substance, and an uncoloured or coloured liquid like water. This organizable matter continues to fill the asci until such time as they have nearly reached the maximum of their development; after which the fluid cleaves into a given number of portions, according to the number of spores about to be contained in an ascus, the now separated portions assume, little by little, a more consistent form, but remain in some measure agglutinated together until the external wall or shell of the spore is accomplished, which is destined to give them their definite character, the attainment of which is now the next step in their development. This wall is apparently formed by the separation and condensation of one or two of the ingredients, constituting the original fluid, and appears to be built up either from the minute granules alone, or from a portion of them cemented together by the liquid. I am strengthened in this opinion from the fact, that the majority of spores, when mature, contain very little of the first ingredient, and in a large number none of it. To this there is, however, some exception, as we sometimes see all the spores of an apothecium, when mature, filled with these minute granules: we account for this from the fact, that the asci of such species originally contained a large portion of these granules, and only a small one of the others, consequently, the superabundance not being required in the formation of the spore-walls, it remains mixed up with the other ingredients in the interior of the spores; hence their granular aspect. After the formation of the external spore-wall has taken place, the spores become distinct, and free of all internal adherence, and possess a definite outline. If the now newly-formed spore is to consist of only one cell or *loculus* (*unilocular—see pl.* 1, *figs.* 1, 2, 11, *etc.*), nothing further than a little consolidation of the spore-wall, and a slight expansion of the ascus is required for its completion; after which it becomes fully ripe and ready for expulsion, or, in other words, a perfected body, fit to germinate and produce the species to which it appertains. But if the internal organizable matter is to be divided by some partition, which is very frequently the case, the formation of these partitions commences immediately after the completion of the external spore-wall. *Bilocular* spores are formed by a partitional membrane, being drawn directly across the transverse diameter of the spore, which, on its completion, divides the internal organizable fluid into two loculi of an equal size (*see pl.* 1, *fig.* 13). If a *quadrilocular* spore is contemplated, it is traversed by three transverse partitions—one in the centre, the others towards each end, at about an equal distance from the central one (*see pl.* 1, *fig.* 6); and whatever other number of loculi may be required, their formation is generally effected in the same manner, except in the case of the *polari-bilocular* and *muriform-multilocular* spores. The *polari-bilocular* spores have an elliptical outline after the formation of the external spore-wall has been accomplished, and are filled with organizable fluid, which becomes divided by two partitional membranes, both of which are at first placed close together, and after having stretched across the entire breadth of the spore, each membrane then recedes in an opposite direction, and draws the internal fluid to the ends or poles of the spores, and thus, on their completion, they resemble the arctic and antarctic circles of a map of the globe (*see pl.* 2, *fig.* 41). It sometimes, however, happens that the whole of the internal matter of a spore is enveloped in only one internal membrane, the sides of which eventually contract, leaving a channel of communication between the poles (*see pl.* 2, *fig.* 43*a*); and at other times the contracting force of the internal membranes appears to be so strong as to cause a bulging of the extremeties beyond the elliptic outline of the spore (*see pl.* 2, *fig.* 42). The formation of a spore of the *muriform-multilocular* type is effected by the whole of the internal fluid of a spore (after the completion of the external spore-wall) being enveloped in an internal membrane, which eventually cleaves into 3, 5, 7, or more parts, the partitions crossing the spore transversely, after which each becomes again divided by 1, 2, 4, or more longitudinal partitions, and thus, on their completion, the internal organization resembles the stones in a wall; hence the origin of the term *muriform-multilocular.* I ought to say, however, that the longitudinal partitions are very often irregular, and do not always run in a straight line; and that the corners also of the loculi are frequently rounded (*see pl.* 1 *et.* 3. *figs.* 3, 7, 8, 10, 57, 59, *etc*)

The frequent occurrence of an oily substance amongst the ingredients of the organizable fluid is demonstrated, and its presence exemplified in the perfected spores of many species by its becoming united into one or more pale yellow globules or nuclei, which may be often seen near the extremities, or in the middle of each spore, *e.g. Lecanora subfusca, Lecidea goniophila*, etc.

The number of spores produced in each ascus varies in different species, the usual numbers being 1, 2, 4, 6, 8, 16, 32, 50, or 100, that of 8 being the most, and those of 1 and 100 the least frequent. Their form also is extremely variable in different species, being either elliptical, oblong, ovate, obovate, clavate, fusiform, acicular, or of an intermediate form; and in size they are equally variable, the smallest spores being only about ·00025 to ·0005 inch in diameter (*Acarospora smaragdula*, ε. *microsticta*); while the largest is ·065 in. long by ·014 in. broad (*Pertusaria globulifera*). Sometimes they are colourless or white, at other times pale yellow, pale green, dark green, olive, brown, red, or nearly black, or intermediate shades of colour.

Notwithstanding the extreme variableness of the spores in different species, in outline, in colour, and in internal structure, they are remarkably constant in the same species; a circumstance which makes them usually very valuable, nay, indeed, often quite indispensable to us when we seek to characterise both species and genera. The thallus of Lichens is often liable to great variation; their apothecia, under atmospheric influences, frequently change in character very considerably, but the form of the asci and spores is rarely (perhaps never) affected, except by age. If we study them, and make use of their distinctions, we shall find that very much that would otherwise be obscure is made plain, and much that would otherwise be very difficult to understand, is made clear to our comprehension.

3RD. SPERMOGONES.

These appearances are usually extremely minute, and differ much in this respect from the apothecia. In a few instances, their form is definable, and clear to the eye, when unassisted; in others it is visible, but undefinable further than as a minute point; while in some others it is altogether invisible. Their presence, however, may be often detected by moistening the thallus with water, which renders them conspicuous. They are ordinarily presented as rounded or oblong nucleiferous corpuscles, and are either naked and sessile on the surface of the thallus, immersed in thallodal elevations, semi-immersed in the superficial strata, or wholly immersed in the substance of the thallus. They are described as *tuberculiform* when naked, and placed on or near the extremities of the segments or ramuli of the thallus, or on the apices of the simple or branched podetia, or on the margins of the scyphi, as in *Cladonia rangiferina, C. coccifera*, &c.—*prominent-verrucæ.* when naked and sessile, and placed on the margins of the lobes of the thallus, as in *Cetraria nivalis, Parmelia Fahlunensis*, &c.—*mammillæform*, when emersed in large prominent thallodal tubercles, as in *Sticta herbacea, S. glomuli-*

fera, &c.—*papillæform,* when semi-immersed, or prominent on the surface of the thallus, as in *Parmelia saxatilis,* var. *omphalodes,* &c.—*punctiform,* when wholly immersed in the substance of the thallus, as in *Roccella tinctoria, Parmelia tiliacea,* &c.—and *verrucæform,* when they are somewhat prominent, irregular in their outline, or confluent, or congregated together in groups, as in the genus *Stereocaulon,* &c.

In colour, the spermogones are either black, brown, orange-red, brownish-red, yellow, concolorous with the thallus to which they belong, or of an intermediate colour; but, as a general rule, in the papillæform, and punctiform spermogones, it is only that part which is exposed to the light, that is so coloured.

In external aspect, when magnified, they bear a general resemblance to the apothecia of the angiocarpous Lichens, but their exterior is found on dissection, to be essentially different; consequently, however great the analogy, in some instances, in their external aspect, their internal elements, under all circumstances, will serve to identify them and prevent confusion.

They are in general composed of a shell or *receptacle,* and a *nucleus,* which contains certain elements, denominated *sterigmata* and *spermatia.*

The *receptacle* is in general composed of a tissue of very fine cells, which are either round, rounded, oblong, or angular, and cemented together in a similar manner to those of the perithecium in the angiocarpi, from which indeed it only differs, by being much more minute, and by its exterior surface being more or less confused with the surrounding elements of the substance of the thallus; or in other words, by the line of demarcation between the receptacle and the thallus not being, generally speaking, so well defined as in the perithecium of the verrucæform apothecia. The *ostiole,* orifice, or pore, is also in general similar to the ostiole of the fruits in that division, being normally round and even, and also liable to become stellato-fissured, or otherwise irregular, thus offering a striking analogy to the apothecia of *Sphærophoron* and *Petractis.*

The *nucleus* consists of the sterigmata, at times a few elongated and anastomosing hyaline filaments, the spermatia, and a mucilaginous substance, the former being in general closely bound together, and kept in position by the latter: its colour is usually similar to what we observe in the nucleus of the angiocarpi, being mostly white, or grayish-white, sometimes pale-yellow, and at others slightly tinged with red. The form which it assumes is generally simple, having an oblong, elliptical, or sub-globular outline; sometimes however its circumferencial outline is very irregular, here and there much indented, and often appearing as if divided into several sinuosities or loculi.

The *sterigmata* are the very fine, more or less elongated, cellules which are attached to the interior face of the receptacle, which grow from it in a somewhat convergent manner towards the centre, and frequently nearly fill the entire spermogonic cavity. They are chiefly presented under two principal modifications—*simple* sterigmata, and *articulated* sterigmata. Both forms being liable to become a little ramified. The simple sterigmata each consists of a single variously elongated, subcylindrical, or cylindrical cell, of an equal width throughout or attenuated towards the summit; and when ramified, the ramifications arise from the base or near it, assuming a subpalmate figure, as in *Ramalina, Roccella,* &c. The articulated sterigmata are composed of a greater or less number of variously elongated cells, placed one above the other, the uppermost cell being at times, either rather larger than the others, or slightly attenuated. The ramifications here are liable to arise from any point between their base and summit; consequently are often very irregular and variable in their appearance, *e. g.*, *Sticta*, *Parmelia,* &c. These sterigmatic cellules appear to contain an uncoloured homogeneous fluid; and after they have attained a certain degree of maturity, possess the faculty of producing from their apices extremely minute, solid, homogeneous, and uncoloured bodies, called *spermatia;* how these bodies are really formed I will not venture to say, further than that, at first they appear as minute protrusions on the summit of the sterigmatic cells, and afterwards become gradually elongated, until they arrive at maturity; they then become surrounded at their base by a mark or ring, causing them to appear as if cut, and eventually fall into the cavity of the nucleus as perfected spermatia. The sterigmata appear also to have the power of producing a succession of these bodies, but apparently only one at a time, and those species possessing articulated or compound sterigmata, produce them from the superior margins of the articuli, as well as from their summits. When the spermatia are fully matured, and detached from the sterigmata, they accumulate in the centre of the spermogonic cavity, and about the ostiole of the receptacle, until the period of their ejection arrives, which is effected in a manner similar to the spores. It is from the presence of these vast accumulations of free spermatia in the cavity of the spermogones, that the inference is deduced, that the sterigmata possess the power of producing them in succession. Sometimes there are a number of elongated and anastomosing hyaline filaments mixed with the sterigmata, which are generally considered as abortive or sterile sterigmata, and in some measure they are analogous to the paraphyses in the thalamium, or nucleus of apothecia.

The *spermatia,* are the exceedingly minute, delicate, homogeneous, and uncoloured bodies, which are produced from the apices and superior margins of the articuli of the sterigmata; and however great their tenuity, their size and form, in the same species are remarkably constant; indeed their variations in different species, are not at all comparable to those of the spores. Hence the spermatia are of less value than the spores as a specific guide, yet nevertheless they do at times afford a distinguishing character. The following modifications are those most frequently met with, viz.: *cylindrical,* straight spermatia of an equal thickness throughout, the extremities being rounded and obtuse, as in *Cetraria nivalis,* &c., — *cylindrico-acicular,* straight spermatia, but slightly attenuated towards or at the extremities, as in *Parmelia physodes,* &c.,—*subclavato-acicular,* straight spermatia, slightly swollen at one extremity, attenuated at the other into a more or less acute point, as in *Cetraria juniperina,* &c.,—*Cylindrico-arcuate,* curved spermatia of an equal thickness throughout, the extremities obtuse, or rather thickened in the middle and attenuated at the extremity, e.g., *Roccellæ, Cladoniæ,* &c.,—*oblong, oblongo-cylindrical,* and *ellipsoid,* are all generally short spermatia, having a more or less elliptic outline, e.g., *Ramalinæ,* several species in the tribes *Lecanoraceæ, Lecideaceæ,* &c.

Although the spermogones are generally supposed, by continental Lichenists, to be analogous to male organs; it is by no means a decided and settled question amongst them that they really are so, at the same time a variety of arguments of a more or less conclusive nature have been adduced by them in support of their theory; *direct* proof that they are possessed of any fecundating or fertilizing influence on the spores is nevertheless wanting. But that these appearances are not parasites, or productions foreign to the organization of the Lichens is sufficiently proved; by the constancy of their occurrence—the relative period of their development as compared with the apothecia, generally a little before them—by their occurring almost, if not always, on those species usually found in an infertile state in this country—and by the great similarity of structure between the receptacle of a spermogone, and the perithecium of verrucæform apothecia.

Several Lichens also possess other organs called *Pycnides*. They are very minute papillæform, or verrucæform appearances, resembling to some extent in their outward aspect the spermogones, and like them more or less immersed in the superficial strata of the thallus, and are presented on its surface as very minute black, or brown papillæ. Their internal organization differs from that of spermogones, by their sterigmata being stouter and almost always quite simple, and by their producing from their apices, mostly oval or pyriform unilocular or plurilocular bodies, called *stylospores*, which are apparently filled with organic matter, similar to the spores. There has been much speculation respecting the nature of the pycnides and the functions of the stylospores. The pycnides have been thought to be either a different form of the spermogones, or secondary apothecia, and the stylospores as supplementary spores; however, be this as it may, their resemblance to the fruits of certain *Fungi*, is equal, if not greater, than either their affinity to the spermogones, or to the apothecia.

My knowledge of the spermogones and pycnides is comparatively speaking of recent date. Indeed my attention has not been *specially* directed to them; and previous to the last two or three years, I was accustomed to regard them as parasitic Fungi, or *Pyronotheæ*, and it is partly on account of my recent acquaintance with them, as organs of the species in which they occur, that they have not been described in detail under the several species in the present edition of this work. I may nevertheless here state, that I do not at present regard them of much importance in furnishing generic or specific characteristics; and that I incline to the idea that they are interesting rather from a physiological than a diagnostic point of view.

CLASSIFICATION.

Authors upon lichenology have differed exceedingly, as regards the plans of classification which they have proposed or adopted. In their attempts to arrange genera and species, according to the most convenient, or the most natural method; very different indeed, has been the extent to which they have employed the different organs, and the degree of importance which they have attached to each. Since the appearance of ACHARIUS' *Lich. Univ.*, (1810) and *Synopsis*, (1814) SCHÆRER, FEE, FRIES, BORRER, TAYLOR, LEIGHTON, MASSALONGO, HEPP, KOERBER, LINDSAY, NYLANDER, and several others, whose works, I have not yet had an opportunity of studying, have written upon Lichens, and nearly all employed essentially different systems of arrangement. But to recapitulate or criticise those various arrangements would only be a dry and tedious task, and one which in the end would probably prove abortive of good. Let it therefore suffice for me to say here, that I am fully persuaded that each possesses its peculiar merits and its demerits, and that we are much indebted to their researches for the knowledge now possessed of these obscure vegetables.

On the publication of *Leighton's* monograph of the *British Angiocarpous Lichens,* elucidated by their *sporidia,* in 1851, a new era commenced as regards the study and classification of these plants. Previous to its appearance little was known as to the real value of these organs; true, Lichenists were cognizant of their presence, but with the exception of *Eschweiler,* and *Fee,* they were never applied as distinctive characteristics; indeed the application of them by these last authors was but limited, and they were not by any means employed to the extent they are at the present day in confirmation of genera and species. Since the appearance of *Leighton's* work, many continental botanists have devoted themselves to the elucidation of Lichens by means of their spores, and more recently some have devoted considerable attention to their spermogones, but in this department perhaps our own countryman, *Dr. Lindsay,* has done more than any other individual Lichenist.

Seeing that no work embracing a description of the spores of the whole of the *British Lichens* has ever been published, considerable difficulties have had to be surmounted in the preparation of this *manual.* On its commencement I purposed giving a simple definition of each species, and of adopting the arrangement of *Fries' Lichenographia Europæa Reformata,* but after proceeding in my investigation, for some time in this manner, I was led to see the insufficiency of the grounds on which several of his genera rested, especially *Parmelia, Biatora, Lecidea, Opegrapha,* and *Verrucaria,* all of which, highly appreciating as I do his work, I found it utterly impossible to adopt as defined by him. His necessarily limited knowledge of the value of the spores as a generic and specific guide, has led him into errors which he would never have committed had he been aided by them; errors which however are only perceptible when a thorough acquaintance with the spores has been acquired. I was next led to examine more minutely the system as laid down by SCHÆRER, in his *Enumeratio Critica;* but this I found, although totally different to that propounded by FRIES twenty years previously, to be, on account of the little recourse he had to the anatomy of the species, much inferior in every respect to either that of Fries, or even the old Acharian system.

During the last ten years there has been much information acquired, both as regards the anatomy and the classification of these plants, and as I have already stated, since the appearance of LEIGHTON'S *Angiocarpous Lichens,* many continental Lichenists have written on these vegetables, amongst whom the names of HEPP, MASSALONGO, KOERBER, and NYLANDER, stand prominent. The systems of classification wrought out and proposed by MASSALONGO and KOERBER, place great stress upon the spores, in the formation of genera and the characterisation of species; and a number of the genera which they propose and define, are separated from each other, mainly by characters which the spores furnish: this involves a considerable innovation upon the doings of their predecessors and innovations for the mere sake of change, it must be admitted are very undesirable. The plan which they propose has not escaped some hostile criticism, but it seems to me that if we strive to divest ourselves of prejudice, and to judge respecting the matter without undue bias and partiality, we shall find that by following this plan, far more than is lost by the disadvantage of change, is gained in increased precision and naturalness, and that much that was incomplete and anomalous is done away with.

In 1858, DR. NYLANDER, of Paris, published his "*Enumeration Generale des Lichens*," and the first part of his "*Synopsis Methodica Lichenum*," in which again we have the whole of the arrangements of both ancient and modern authors overthrown and assailed, as reposing upon arbitrary and artificial principles, and replaced by another *new classification*, in which, at first sight, it is difficult to determine on what it rests. In the main outline of his arrangement, he evidently wishes to show the near relation of certain *Lichens* to some species of *Algæ* on the one hand, and to *Fungi* on the other; and apparently connects these three great groups of Cryptogams together by a sort of two-fold chain, commencing with those genera nearest allied to Algæ, working upwards to those genera best developed, and from thence retrograding and terminating with species nearest allied to Fungi. His genera are founded principally on a combination of the habit and general external appearance of the Lichens, and the nature of their spermogones when practicable; but the spores are altogether discarded, as furnishing generic characters.

Since the appearance of the above works, a "*Memoir on the Spermogones and Pycnides of the filamentose, fruticulose, and foliaceous Lichens*," by W. LAUDER LINDSAY, M.D., F.L.S., has been issued "from the Transactions of the Royal Society of Edinburgh," in which the talented writer, if I rightly interpret the general tenor of his *Memoir*, seeks to establish the adoption of the spermogones, in the formation of *certain genera*, to a position as high, if not higher, than that of the spores, and apparently desires a reduction of the recently created genera, and formerly as well as the lately recognised species.

So confusing and contradictory are many of the opinions promulgated by writers of the highest repute, that it may suffice for me, without entering upon criticism, that might seem invidious, to direct the attention of my readers to what I have done in the matter of classification, formation of genera, &c.

In the first place, the whole of our native species, constituting the class of Lichens, have been divided into three principal groups, or families, viz.: 1*st. Collemaceæ*, *2nd. Myriangiaceæ*, *3rd. Lichenaceæ*, after the manner of Nylander's Synopsis Lichenum, each family being founded upon a combination of the habit, external aspect, and internal structure, of the respective species; and each family has then been redivided into two divisions, viz.: *Gymnocarpi*, and *Angiocarpi;* arranging all the species possessing, when mature, discoid or open apothecia in the division *gymnocarpi*, as its name implies (γυμνος—naked or uncovered, and καρπος—a fruit); and all species possessing verrucæform or nucleiferous apothecia, in that of angiocarpi (ανγιος—a covering, and καρπος—a fruit); subdividing those again into *tribes*, *sub-tribes*, and *genera;* the two first being founded upon the external aspect, and the last upon a combination of the most striking characteristics of the species. I have not always given precedence to one single character, because in the different tribes, it is evidently sometimes to one, and sometimes to another that precedence ought to be given. The *spores*, however, in the majority of cases have had the most importance attached to them, on account of their unchangeable nature, and I cannot close without again remarking that, of all organs furnished by a given group of plants, none offer so many real, constant, and physiological characters as the spores of the Lichens, for the formation of a simple and natural classification ; but to reject them, and at the same time admit the spermogones, appears to me to be the extreme of folly. It will be found in the following pages that I have frequently assigned to the spores, a position of the first importance, and I have done so not from a desire, or love of change, but from the fullest conviction, confirmed by many years' experience and the *examination* of an immense number of specimens from various parts of this country and of Europe, that they are entitled to the place so assigned. And while I look upon the spermogones as organs much inferior to the spores, I would whenever practicable admit them also, but in the present state of our knowledge, both as regards their functions and utility, I do not think that we are justified in founding genera on their characters, except in extreme cases.

The following synopsis of the genera, &c., will more fully explain the arrangement which I have employed, in the preparation of this work.

LICHENES.

SYNOPSIS OF THE GENERA.

FAM. 1.—COLLEMACEÆ, (*Nyl.*)

Thallus cartilaginous, coriaceous, or membranaceous in a dry state, more or less distended, turgid, and gelatinous when wet; in form polymorphous, lobed, lacerated, or branched; varying in colour from pale green to dark olive, brown, or black, rarely grey or glaucous. Internal anatomic elements indistinctly stratified; cortical stratum reduced to that of a thin cellular or non-cellular epithallus; gonidiac granules moniliform-coherent, agglomerated, or simple, imbedded and disposed in various modes in an uncoloured gelatinous substance, very greedy of water; medullary composed of hyaline filaments or cells. Apothecia either globose, nucleiferous, or disciform, thalamiferous.

DIV. 1. ANGIOCARPI, (*Fries*).

Apothecia closed, globose, nucleiferous; the apex at length perforated with a simple pore.

TRIBE 1. LICHINACEÆ.

Thallus cæspitoso-fruticulose, or cæspitoso-filamentose; epithallus cellular, or non-cellular. Apothecia globose, or ovate; nucleus enveloped by a thallodal receptacle.

GEN. 1. LICHINA, (*Ag.*) Apothecia terminal; nucleus pale, gelatinous; paraphyses very slender capillaceous; asci elongato-cylindrical, 8 spored; spores uniserial, subelliptical, often subtetragonal, unilocular, uncoloured. Thallus cartilaginous, fruticulose, dichotomously branched.

2. EPHEBE, (*Fries.*) "Apothecia minute, enclosed in swollen ovate, or subelliptical portions of the thallus; spores minute, oblong, unilocular, uncoloured." Thallus cæspitoso-filamentose, divaricatedly branched; branches very slender, somewhat capillary; epithallus distinctly cellular; gonidiac granules large, 2 to 4 or more, aggregated together.

DIV. 2. GYMNOCARPI, (*Fries*).

Apothecia normally open, disciform; thallamium contained in a thallodal exciple, or a proper exciple.

TRIBE 1. SPILONEMEÆ.

Thallus fruticuloso-subfilamentose, very minute; epithallus unequally cellular; gonidiac granules arranged in transverse series Apothecia subpatellæform.

GEN. 1. SPILONEMA. (*Born.*) Apothecia lentiform, immarginate; thalamium arising from a brownish black, simple hypothecium; paraphyses slender articulated; asci oblongo-clavate, 8 spored; spores oblong, unilocular, uncoloured. Thallus fruticulose, minute; branches cylindrical, entangled.

TRIBE 2. COLLEMEÆ.

Thallus cartilaginous, coriaceous, or membranaceous, variously lobed and laciniated, more or less rigid when dry; gelatinous, distended and turgid when wet; epithallus noncellular; gonidiac granules simple, or moniliform-coherent. Apothecia scutelliform.

GEN. 1. SYNALISSA, *(Fries)*. Apothecia depresso-subscutelliform; thalamium arising from a dull yellow simple hypothecium; asci subclavate, 8 to 24 spored; spores elliptical or subspherical, unilocular, uncoloured. Thallus pulvinate, subcrustaceous, slightly lobed, cartilaginous when dry, soft and somewhat gelatinous when wet.

2. COLLEMA, *(Hoffm.)* Apothecia scutelliform; thalamium arising from a simple or double hypothecium; asci clavæform, 4 to 8 spored; spores oblong, elliptical-oblong, or ovate, quadrilocular, becoming irregularly muriform-multilocular, uncoloured, or pale yellow. Thallus variously lobed, when wet gelatinous.

3. SYNECHOBLASTUS, *(Trevis.)* Apothecia scutelliform; asci clavæform, 8 spored; spores acicular, elongato-fusiform, or linear-oblong, quadrilocular, or from quadrilocular becoming multilocular, but never *muriform;* loculi constantly uniserial, uncoloured, or pale yellow. Thallus as in *Collema.*

TRIBE 3. LEPTOGIACEÆ.

Thallus coriaceo-membranaceous, foliaceous, or caulescent, variously lobed and laciniated; rigid when dry, gelatinous and somewhat turgid when wet; epithallus distinctly cellular; gonidiac granules simple or moniliform-coherent. Apothecia scutelliform or patellæform.

GEN. 1. MALLOTIUM, *(Fw.)* Apothecia scutelliform; asci subventricose, 8 spored; spores subelliptical, quadrilocular, becoming submuriform-multilocular, uncoloured, or pale yellow. Thallus foliaceous; epithallus distinctly cellular on the upper side, under glaucous, tomentose.

2. LEPTOGIUM, *(Fries)*. Apothecia from urceolate, becoming subscutelliform or patellæform; asci elongato-clavate, 8 spored; spores elliptical-oblong, ovate, or oblongo-ventricose, from quadrilocular becoming irregularly muriform-multilocular, uncoloured, or pale yellow. Thallus foliaceous; epithallus distinctly cellular on both sides.

3. POLYCHIDIUM, *(Ach.)* Apothecia subterminal, horizontal, scutelliform; asci clavato-ventricose, 8 spored; spores oblongo-fusiform, bilocular, pale yellow. Thallus filamentoso-fruticulose, pulvinate; epithallus distinctly cellular.

FAM. 2. MYRIANGIACEÆ, *(Nyl.)*

Thallus equally cellular, unstratified; coriaceous, noduloso-pulvinate, olive-black. Apothecia subscutelliform, innate, of an equal cellular texture, and of nearly the same colour as the thallus; thalamium destitute of amyloid matter, paraphyses, and hypothecium, asci spherical, or elliptical, irregularly imbedded in the cellular thalamium.

TRIBE 1. MYRIANGIEÆ.

GEN. 1. MYRIANGIUM, (*Mont. et Berk.*) Apothecia subscutelliform, innate in the apices of the thallus; thalamium cellular, of nearly the same colour as the thallus; asci subspherical, 8 spored; spores oblong, or elliptical-oblong, quadrilocular, or irregularly submuriform-multilocular, pale yellow. Thallus coriaceous, noduloso-pulvinate.

FAM. 3. LICHENACEÆ, (*Nyl.*)

Thallus extremely variable, both in form, colour, and texture, being sometimes fruticulose, at others foliaceous, squamulose, squamuloso-radiated, granuloso-crustaceous, pulverulent, and sometimes none, or athalline; in substance, varying from coriaceous to membranaceous, and from tartareous to a mere film; and in colour, white, grey, yellow, orange, brown, red, and sometimes black, or blackish, with all their intermediate shades. Internal anatomic elements normally stratified; gonidiac granules rarely, perhaps never, moniliform-coherent. Apothecia either disciform, thalamiferous; or verrucæform, nucleiferous; stipitate, sessile, or innate; very variable in colour, but rarely concolorous with the thallus.

DIV. 1. GYMNOCARPI, (*Fries.*)

Apothecia normally open, disciform, lirellæform, crateriform, or maculæform; thalamium contained in a thallodal exciple, a proper exciple, a compound exciple, or destitute of one.

TRIBE 1. CLADONIACEÆ, (*Zenk.*)

Thallus in the superior genera, fruticuloso-caulescent, erect or ascendant; podetia arising from a more or less evident, horizontal squamuloso-granulose, or crustaceous thallus; in the inferior genera, simply crustaceous, uniform. Apothecia terminal or lateral, stipitate or sessile, orbicular, becoming cephaloid; internally lacunose, or solid, variously margined, or immarginate.

SUBTRIBE 1. CLADONIEÆ.

Thallus fruticuloso-ascendant, consisting of a horizontal squamuloso-foliaceous, squamuloso-granulose, or crustaceous proper thallus, from which arises a vertical caulescent, cartilaginous fistulose thallus. Apothecia terminal or lateral, orbicular, cephaloid; internally lacunose.

GEN. 1. CLADONIA, (*Hoffm.*) Apothecia orbicular, sub-margined by a proper exciple, becoming inflated, cephaloid, and immarginate; internally lacunose, or hollow; asci clavæform, 8 spored; spores minute, elliptical-oblong, or oblong, unilocular, uncoloured. Podetia cartilaginous, vertical, fistulose, or fruticulose, the extremities either simple stipiform, dilato-tubiform, or scyphiform.

SUBTRIBE 2. BÆOMYCEÆ, (*Fee.*)

Thallus effuse, crustaceous. Apothecia stipitate or sessile, cephaloid, or patellæform; internally lacunose, or solid.

Gen. 2. Bæomyces, (*Pers.*) Apothecia stipitate, pileiform, or globose, immarginate; internally solid, or empty and araneous; asci elongato-cylindrical, 6 to 8 spored; spores elliptical, ellipticofusiform, or linear-fusiform, often incurved, unilocular, uncoloured. Thallus crustaceous, uniform.

3. Icmadophila, (*Ehrh.*) Apothecia sessile, patellæform, becoming immarginate; internally solid; asci, cylindrical, 8 spored; spores subfusiform, bilocular, uncoloured. Thallus crustaceous, uniform.

Subtribe 3. Stereocauleæ.

Thallus fruticuloso-caulescent, solid, erect or ascendant, arising from a more or less evanescent horizontal adnate granulose thallus; the upper parts more or less clothed with squamuloso-granulose excrescences. Apothecia turbinato-dilated, solid, margined by a, more or less evident, thallodal exciple, becoming cephaloid and immarginate.

4. Stereocaulon, (*Schreb.*) Apothecia terminal or lateral; asci linear-cuneate, 4 to 6 spored; spores acicular, elongata-subclavate or fusiform, 2 to 8 locular, uncoloured. Thallus fruticuloso-caulescent, solid.

Subtribe 4. Siphuleæ, (*Nyl.*)

Thallus vertical, radiculoso-fruticulose, erect; or elongato-subuliform, subsimple, prostrate; internally cottony, or hollow. Apothecia . . . .? .

5. Thamnolia, (*Ach.*) Apothecia. . . . . ? . Thallus elongato-subuliform, subsimple, prostrate; internally hollow.

Tribe 2. Usneaceæ, (*Eschw.*)

Thallus fruticulose, or subfruticulose, erect, pendulous, or sarmentose, branched, or laciniated; branches round, cylindrico-compressed, or canaliculato-foliaceous. Apothecia peltate, or scutelliform.

Subtribe 1. Usneæ.

Thallus fruticulose, erect, becoming pendulous; branches round; medullary stratum solid, composed of hyaline filaments strongly agglutinated together. Apothecia peltate.

Gen. 1. Usnea, (*Dill.*) Apothecia subterminal, the margin of the thallodal exciple becoming radiato-ciliated; asci oblongo-ovate, 8 spored; spores oblong, or elliptical, unilocular, uncoloured. Thallus fruticulose.

Subtribe 2. Ramalineæ, (*Fee*).

Thallus fruticulose, erect, pendulous, or ascendant, filamentose and roundly compressed, or subfoliaceous compressed or dilated, concolorous on both sides, or discoloured; medullary stratum, soft, composed of hyaline filaments. Apothecia scutelliform.

2. Alectoria, (*Ach.*) Spores oblong, unilocular, sub-uncoloured. Thallus fruticulose, or filamentose, roundly compressed, or linear-laciniated, concolorous on both sides.

3. Evernia, (*Ach.*) Apothecia lateral; asci obovate, or cuneate, 8 spored; spores elliptical, or subglobose, uncoloured. Thallus

ascendant, subfoliaceous, compressed, branched and laciniated; under side discoloured, canaliculate.

4. RAMALINA, (*Ach.*) Apothecia scattered on both sides of the thallus, and nearly of the same colour; asci clavate, 6 to 8 spored; spores linear-oblong, straight or curved, bilocular, uncoloured. Thallus subfoliaceous, erect, or pendulous, compressed, branched and laciniated, concolorous on both sides.

SUBTRIBE 3. ROCCELLEÆ.

Thallus subfruticulose, erect, afterwards pendulous, branched and laciniated, round, rounded, or compressed, concolorous on both sides; medullary stratum soft. Apothecia scutelliform; disc bluish-black, cæsio-pruinose.

5. ROCCELLA, (*DC.*) Apothecia lateral; thalamium arising from a brownish-black carbonaceous hypothecium; asci clavate, 8 spored; spores clavato-fusiform, or obtusely-fusiform, straight or curved, quadrilocular, uncoloured. Thallus branched, or laciniated, rounded or compressed, smooth and equal, or nodulose.

SUBTRIBE 4. CETRARIEÆ.

Thallus fruticulose, canaliculato-foliaceous, or foliaceous, sub-erect, or ascendant, branched, or laciniated, rounded, or compressed and dilated, concolorous on both sides, or discoloured. Apothecia peltæform, or scutellato-peltate, affixed obliquely to the apices of the thallus.

6. CORNICULARIA, (*Ach.*) Apothecia peltæform; thallodal margin, smooth or denticulated; asci oblong, or cuneate, 8 spored; spores elliptical, or ovate, unilocular, uncoloured. Thallus fruticulose, or canaliculato-foliaceous, erect, or ascendant; branched, or laciniated, rounded, or compressed and dilated, concolorous on both sides.

7. CETRARIA, (*Ach.*). Apothecia scutellato-peltate; asci cuneate, or subventricose, 8 spored; spores elliptical, oblong, or subglobose, unilocular, uncoloured. Thallus foliaceo-lobed, lobes ascendant, or depressed, under side mostly discoloured.

TRIBE 3. PELTIDEACEÆ, (*Fw.*)

Thallus frondoso-foliaceous, coriaceous, papyraceo-membranaceous; hypothallus villose, or venose, adnate to the under side of the thallus. Apothecia peltæform, or reniform, adnate to the upper surface, under surface, or to the disc of the thallus.

GEN. 1. NEPHROMA, (*Ach.*) Apothecia reniform, adnate to the under side of the apices of the lobules, or proper portions of the thallus; asci clavate, 8 spored; spores obtusely fusiform, straight, or slightly curved, quadrilocular, pale yellowish brown. Thallus foliaceous, submembranaceous; under side somewhat villose.

2. PELTIGERA, (*Willd.*) Apothecia peltæform, adnate to the upper side of the elongated lobes of the thallus; asci clavate, 6 to 8 spored; spores acicular, fusiform, or clavato-fusiform, normally quadrilocular, often 6 — 8 — 10 locular, uncoloured. Thallus frondoso-foliaceous, coriaceous, or membranaceous, under side venose.

3. SOLORINA, (*Ach.*) Apothecia peltate, adnate to the disc of the

thallus; asci elongato-subventricose, or oblongo-cylindrical, 4 spored; spores oblong, or obtusely-fusiform, bilocular, pale bright-red, or dark-red. Thallus submonophyllous, coriaceo-membranaceous; under side venose, or lanuginose.

TRIBE 4. PARMELIACEÆ, (*Hook.*)

Thallus normally foliaceous, horizontal; or fruticuloso-foliaceous, ascendant; coriaceous, or membranaceous; hypothallus villose, or fibrillose, adnate to the under side of the thallus. Apothecia scutelliform.

GEN. 1. STICTA, (*Schreb.*) Apothecia scutelliform; asci elongato-clavate, or oblongo-ventricose, 4 to 8 spored; spores fusiform, or clavato-fusiform, from bilocular becoming quadrilocular, pale yellow. Thallus foliaceous, coriaceo-membranaceous; under side villose, variegated with small urceolate *cyphellæ*, or *maculæ*.

2. PARMELIA, (*Ach.*) Apothecia scutelliform; asci clavate, or oblongo-obovate, 8 spored; spores elliptical, oblong, or ovate, unilocular, uncoloured. Thallus foliaceous, imbricated; under side more or less fibrous.

3. BORRERA, (*Ach.*) Apothecia scutelliform; asci clavate or subventricose, 8 spored; spores oblong, often slightly constricted in the middle, bilocular, varying in colour from green to dark brown. Thallus foliaceo-fruticulose, ascendant, or loosely decumbent; or foliaceous, stellato-appressed; under side more or less fibrillose.

4. PHYSCIA, (*Schreb.*) Apothecia scutelliform; asci oblongo-subventricose, 8 or 24 spored; spores elliptical oblong, polari-bilocular, uncoloured. Thallus fruticuloso-foliaceous; under side obsoletely fibrillose.

TRIBE 5. UMBILICARIACEÆ.) *Fee*)

Thallus horizontal, foliaceous, coriaceo-cartilaginous, monophyllous, or polyphyllous, affixed to the basis of attachment by a central point. Hypothallus none. Apothecia erumpent from the disc of the thallus, sessile, pseudo-patellæform, simple or compound.

GEN. 1. UMBILICARIA, (*Hoffm.*) Apothecia from tuberculiform becoming subpatellæform, simple; asci oblongo-saccate, one spored; spores oblong, or elliptical, reticulato-multilocular; pale yellowish brown. Thallus coriaceous, monophyllous.

2. GYROPHORA, (*Ach.*) Apothecia pseudo-patellæform, simple or compound; asci clavate, 8 spored; spores elliptical-oblong, unilocular, uncoloured. Thallus submonophyllous or polyphyllous.

TRIBE 6. LECANORACEÆ, (*Fee.*)

Thallus subfoliaceous, squamuloso-radiated, or squamulose, in the superior genera; squamuloso-crustaceous, or crustaceous, in the inferior. Hypothallus in some persistent, in others evanescent, and in a few absent. Apothecia scutelliform, subpatellæform, or urceolate.

SUBTRIBE 1. PANNARINEÆ, (*Kbr.*)

Thallus subfoliaceous, squamuloso-radiated, or squamulose; hypothallus bluish-black. Apothecia scutelliform, or subpatellæform.

GEN. 1. PANNARIA, (*Delis.*) Apothecia scutelliform, or subpatellæform; asci oblong, subclavate, or subventricose, 8 spored; spores oblong, elliptical-oblong and more or less attenuated at the extremities, or subfusiform, unilocular, the external spore-wall often crenulated, uncoloured. Thallus subfoliaceous, or squamuloso-radiated, or squamulose; hypothallus bluish-black.

2. MASSALONGIA, (*Kbr.*) Apothecia scutelliform, or subpatellæform; asci subclavate, 8 spored; spores subfusiform, bilocular, uncoloured. Thallus foliaceo-squamulose, or squamulose; hypothallus brownish-black evanescent.

3. AMPHILOMA, (*Fries.*) "Apothecia scutelliform, very rarely produced." Thallus membranaceous, granuloso-pulverulent in the centre, lobed at the circumference; hypothallus tomentose, brown, or bluish-black.

SUBTRIBE 2. PLACODINEÆ.

Thallus rimoso-areolate, or squamulose in the centre, squamuloso-radiated at the circumference; hypothallus often indistinct. Apothecia scutelliform.

4. SQUAMARIA, (*DC.*) Asci oblongo-clavate, 8 spored; spores oblong, or elliptical-oblong, unilocular, uncoloured. Thallus squamuloso-radiated.

5. PLACODIUM, (*DC.*) Asci clavato-cylindrical, 8 spored; spores elliptical, or oblong, polari-bilocular, uncoloured. Thallus squamuloso-radiated.

SUBTRIBE 3. LECANORINEÆ.

Thallus crustaceous, uniform. Apothecia scutelliform, or subpatellæform.

6. CALLOPISMA, (*De Not.*) Apothecia normally scutelliform, at times subpatellæform, or patellæform; asci clavate, oblong, or subventricose, 8, 24, or 32 spored; spores elliptical, or oblong, polari-bilocular, uncoloured. Thallus crustaceous.

7. LECANIA, (*Massal.*) Apothecia scutelliform, sometimes becoming cephaloid; asci clavato-cylindrical, 8 or 16 spored; spores elliptical, or linear-oblong, bilocular, or quadrilocular, uncoloured. Thallus crustaceous, effuse.

8. RINODINA, (*Ach.*) Apothecia scutelliform; asci clavate, 8 or 16 spored; spores elliptical-oblong, or oblong, bilocular, varying in colour from green to dark brown. Thallus crustaceous; hypothallus brownish black, often wanting.

9. LECANORA, (*Ach.*) Apothecia scutelliform, at times becoming sub-patellæform; asci clavate, or saccate, 8 spored; spores very variable in size, ovate, elliptical-oblong, or subfusiform, unilocular, uncoloured, or pale yellow. Thallus crustaceous, uniform.

10. HÆMATOMMA, (*Massal.*) Apothecia scutelliform; asci clavato-ventricose, 8 spored; spores acicular subincurved, 4-6-8 locular, uncoloured. Thallus crustaceous, uniform.

SUBTRIBE 4. URCEOLARINEÆ.

Thallus squamuloso-crustaceous, or crustaceous; hypothallus black, often wanting. Apothecia more or less urceolate, margined by a compound exciple.

11. ACAROSPORA, (*Massal.*) Apothecia at first immersed, suburceolate, afterwards more or less emersed, nearly plane; asci subclavate, polyspored; spores very minute, oblong, unilocular, uncoloured. Thallus squamuloso-crustaceous.

12. ASPICILIA, (*Massal.*) Apothecia innate; asci ventricose, 4, 6, or 8 spored; spores elliptical, ovate, or subrotund, unilocular, uncoloured. Thallus crustaceous, hypothallus black, or brown, often evanescent.

13. URCEOLARIA, (*Ach.*) Apothecia urceolate, margined by a compound exciple; asci subclavate, 4 spored; spores elliptical-oblong, or subpyriform, muriform-multilocular, varying in colour from green to dark brown. Thallus crustaceous; hypothallus white.

14. PHIALOPSIS, (*Kbr.*) Apothecia urceolate, margined by a compound exciple; asci oblongo-lanceolate, 8 spored; spores elliptical-oblong, quadrilocular, uncoloured. Thallus crustaceous.

15. GYALECTA, (*Ach.*) Apothecia urceolate, margined by a compound exciple; asci cylindrical, 8 spored; spores elliptical-oblong, or subfusiform, from quadrilocular, becoming irregularly multilocular, uncoloured, or pale yellow. Thallus crustaceous.

TRIBE 7. LECIDEACEÆ, (*Fries*).

Thallus variously crustaceous; in the superior genera squamulose, bullato-plicate, or effigurate at the circumference; in the inferior genera crustaceous, uniform; hypothallus for the most part persistent, in a few species altogether wanting. Apothecia patellæform, innate, or sessile, often becoming cephaloid, and sometimes deformed; margined by a ceraceous or a carbonaceous proper exciple, and at times furnished with an accessory thallodal margin.

SUBTRIBE 1. PSORINEÆ, (*Kbr.*)

Thallus squamulose, bullato-plicate, or effigurate at the circumference. Apothecia patellæform, often deformed.

GEN. 1. DIPLOICIA, (*Massal.*) Asci broadly clavate, 8 spored; spores elliptical oblong, bilocular, dark-olive. Thallus rugoso-plicate, foliaceo-effigurate at the circumference.

2. PSORA, (*Hall.*) Asci clavæform, 8 spored; spores oblong, or ovate, unilocular, uncoloured. Thallus squamulose, or squamuloso-crustaceous.

3. THALLIODIMA, (*Massal.*) Asci subclavate, 8 spored; spores oblong, subfusiform, or clavato-fusiform, bilocular, uncoloured. Thallus cartilaginous, squamulose, for the most part forming a bullate, or rugoso-plicate crust.

4. TONINIA, (*Massal.*) Asci clavate, 8 spored; spores linear-oblong, straight or curved; quadrilocular, uncoloured. Thallus squamoso-crustaceous.

5. LEUCOTHECIUM, (*Trevis.*) Apothecia patellæform, margined by a black, cellular exciple; eventually tumid and immarginate; asci linear-clavate, 8 spored; spores elliptical oblong, bi-quadrilocular, uncoloured. Thallus squamuloso-coralline, subcrustaceous; hypothallus bluish-black.

SUBTRIBE 2. LECIDINEÆ.

Thallus crustaceous, uniform; hypothallus various. Apothecia patellæform, often becoming cephaloid, and immarginate.

6. BIATORINA, (*Massal.*) Asci 8 spored; spores oblong, or elliptical-oblong, bilocular, uncoloured.

7. BACIDIA, (*De Not.*) Asci 8 spored; spores very slender, acicular or subclavato-fusiform, variously flexuose, 4 to 18 locular, uncoloured.

8. SCOLICIOSPORUM, (*Massal.*) Asci oblong, obtuse, 8 spored; spores very slender, anguillulæform, normally quadrilocular, uncoloured.

9. RAPHIOSPORA, (*Massal.*) Apothecia sometimes athalline; asci pedicellato-clavate, 6 or 8 spored; spores elongato-acicular, or subclavate, 8 to 12 locular, uncoloured.

10. BILIMBIA, (*De Not.*) Apothecia often immarginate from the first; asci clavæform, 4 to 8 spored; spores fusiform, or clavato-fusiform, 4 to 8 locular, uncoloured.

11. BOMBYLIOSPORA, (*De Not.*) Asci subclavate, 1 spored; spores elongato-elliptical, 8—12 annular-locular, pale yellow.

12. LOPADIUM, (*Kbr.*) Asci saccato-clavate, 1 spored; spores very large, elliptical-oblong, muriform-multilocular, or internally coarsely granular, yellowish-brown.

13. BIATORELLA, (*De Not.*) Asci oblongo-clavate, 50 to 100 spored; spores very minute, elliptical, or oblong, unilocular, uncoloured.

14. PYRRHOSPORA, (*Kbr.*) Apothecia immarginate; asci subclavate, 8 spored; spores oblong, or subglobose, unilocular, reddish-brown, becoming pale brown.

15. LECIDEA, (*Ach.*) Asci clavæform, 8 spored; spores elliptical, or elliptical-oblong, unilocular, uncoloured.

16. SCHÆRERIA, (*Kbr.*) Asci elongato-sublinear, 8 spored; spores uniserial, globose, unilocular, uncoloured.

17. MEGALOSPORA, (*Mey. et Fw.*) Asci oblongo-ventricose, one spored; spores elliptical oblong, unilocular, uncoloured.

18. BUELLIA, (*De Not.*) Asci clavæform, 8 spored; spores elliptical, or oblong, often slightly constricted in the middle, bilocular, varying in colour from green to dark brown.

19. DIPLOTOMMA, (*Fw.*) Apothecia patellæform, margined by a proper exciple, and an accessory thallodal exciple, sometimes becoming immarginate; asci ventricoso-clavate, 8 spored; spores elliptical-oblong, or oblong-obovate, quadrilocular, or irregularly muriform-multilocular, varying in colour from pale green to reddish-brown.

20. RHIZOCARPON, (*Ramond.*) Asci clavæform, 8 spored, spores elliptical-oblong, or oblongo-obovate, irregularly muriform-multilocular, varying in colour from pale-yellow to dark-green or brown.

21. SCHISMATOMMA, (*Fw. et Massal.*) Apothecia patellæform, margined by a cupular, carbonaceous proper exciple; asci clavate, 8 spored; spores fusiform, or acicular, 4-6 locular, uncoloured.

22. DACTYLOSPORA, (*Kbr.*) Apothecia athalline, asci subclavate, 8 spored; spores linear-oblong, quadrilocular, dark reddish-brown.

23. ABROTHALLUS, (*De Not.*) Apothecia athalline; asci obovato-clavate, 8 spored; spores ovate, or elliptical-oblong, bilocular, or subbilocular, varying in colour from pale yellow to olive-green, or brown.

TRIBE 8. XYLOGRAPHIDACEÆ, (*Nyl.*)

Thallus crustaceous, uniform. Apothecia pseudo-lirellæform. Thalamium contained in a cupular carbonaceous exciple.

GEN. 1. LITHOGRAPHA, (*Nyl.*) Apothecia oblong, rounded at the extremities, subinnate, margined by a carbonaceous proper exciple; asci oblongo-subclavate, 8 spored; spores oblong, unilocular, uncoloured.

2. MELANOSPORA, (*Mudd.*) Apothecia rotundato-deformed, subinnato-sessile, black, margined by a carbonaceous proper exciple; asci broadly clavate, 8 spored; spores linear-oblong, bilocular, of a bluish slate, or nearly black colour.

3. STICTOGRAPHA, (*Mudd.*) Apothecia punctiform, becoming linear-oblong, sessile, black, margined by an incurved, carbonaceous proper exciple; asci obovato-clavate, 8 spored; spores irregularly obovate, unequally bilocular, pale brown.

TRIBE 9. GRAPHIDACEÆ, (*Eschw.*)

Thallus crustaceous, uniform. Apothecia lirellæform, simple or substellate, or maculæform, or punctiform; disc rimæform, canaliculate or plane.

SUBTRIBE 1. GRAPHIDEÆ.

Apothecia lirellæform, margined by a carbonaceous proper exciple; disc rimæform, canaliculate, naked or pruinose.

GEN. 1. OPEGRAPHA, (*Humb.*) Apothecia lirellæform, sessile, simple or divided, black; asci clavate, or oblongo-clavate, 8 spored; spores linear oblong, fusiform, or acicular, 4-14 locular, uncoloured.

2. STENOGRAPHA, (*Mudd.*) Apothecia erumpent, lirellæform, black; disc rimæform, or canaliculate, naked or pruinose, margined by an annular carbonaceous proper exciple, and an accessory spurious thallodal margin; asci large, oblongo-ventricose, 6 to 8 spored; spores oblong, or oval, muriform-multilocular, pale yellow.

3. GRAPHIS, (*Adans.*) Apothecia lirellæform, margined by a proper exciple, and at times by an accessory spurious thallodal exciple; asci oblongo-ventricose, 8 spored; spores linear-elongated, the extremities rounded, each containing from 6 to 12 transversely oval loculi; pale yellow.

4. AULACOGRAPHA, (*Leight.*) Apothecia lirellæform, prominent, black; disc rimæform, margined by a palmatifid carbonaceous proper exciple; asci oblongo-ventricose, 6 to 8 spored; spores linear-elongated, each enveloped in a hyaline membrane, and containing from 10 to 13 transversely oval loculi, pale yellow.

SUBTRIBE 2. ARTHONIEÆ.

Apothecia immarginate, pseudo-lirellæform, maculæform, or punctiform.

5. STIGMATIDIUM, (*Mey.*) Apothecia punctiform, or pseudo-lirellæform, simple, subsimple, or radiate; disc open, plane; asci clavate, 8 spored; spores fusiform, or acicular, 6-14 locular, pale yellow.

6. PLATYGRAPHA, (*Nyl.*) Apothecia immersed in thallodal verrucæ,

pseudo-lirellæform, simple, or divided; asci obovato-clavate, 8 spored; spores fusiform, or acicular, quadrilocular, uncoloured.

7. CHIODECTON, (*Fee.*) Apothecia immersed in subrotund thallodal verrucæ, formed of the crumpent medullary stratum; each verruca containing many anastomosing or confluent thalamia, which are at first covered by the thallus, afterwards erumpent, substellato-radiate, or gyrose, pale brown; asci clavate, 8 spored; spores elongato-fusiform, slightly curved, quadrilocular, uncoloured.

8. ARTHONIA, (*Ach.*) Apothecia pseudo-lirellæform, rotundato-deformed, or macular, innato-sessile, plane, or tumid; asci rounded, clavæform, or supyriform, 4-8 spored; spores oblong, obovate, or linear-clavate, 2-4-6-8-locular, uncoloured.

9. ARTHOTHELIUM, (*Massal.*) Apothecia maculæform, deformed, innato-sessile; asci broadly obovato-subpyriform, 8 spored; spores oblong, or ovate, muriform-multilocular, uncoloured.

10. STIGMATELLA, (*Mudd.*) Apothecia punctiform, often becoming confluent, innate; asci linear-clavate, 6 or 8 spored; spores clavate, 6-locular, dark-brown.

TRIBE 10. CALICIACEÆ, (*Fries.*)

Thallus crustaceous, uniform, or none. Apothecia sessile, sub-sessile, or stipitate, turbinate, pyriform, or globose; margined by a proper exciple, which is, for the most part, attenuated into the stipe below; disc of the thalamium eventually expanded, and often displaying the spores in a naked pulverulent mass.

GEN. 1. ACOLIUM, (*Ach.*) Apothecia innate, or sessile, obconico-subpatellæform, margined by a thin, black, proper exciple; asci elongato-clavate, 8 spored; spores oblong, more or less constricted in the middle, bilocular, varying in colour from green to dark brown; often displayed in a naked pulverulent mass on the disc of the thalamium.

2. SPHINCTRINA, (*Fries.*) Apothecia sessile, or substipitate, pyriform, margined by a very black and polished proper exciple; asci elongato-cylindrical, 8 spored; spores spherical, or subspherical, unilocular, greenish-olive.

3. STENOCYBE, (*Nyl.*) Apothecia stipitate, clavato-pyriform, truncate, margined by an inflexed, proper exciple, which extends into the stipe below; asci linear-subpedicellate, 8 spored; spores elliptical, bilocular or quadrilocular, dark brown.

4. CALICIUM, (*Pers.*) Apothecia stipitate, crateriform, black, margined by an horny, proper exciple; asci cylindrical, soon evanescent, 8 spored; spores oblong, mostly constricted in the middle, bilocular, varying in colour from pale yellowish-green, to reddish-brown; often displayed in a naked, pulverulent mass on the disc of the thalamium.

5. CYPHELIUM, (*Ach.*) Apothecia stipitate, crateriform, becoming subglobose, brown or brownish-black, margined by a very thin, proper exciple; asci very minute, clavæform, soon evanescent (8 spored?); spores very minute, spherical, or oblong, unilocular, or obscurely bilocular, pale yellowish-brown; generally displayed in a naked, pulverulent mass on the disc of the thalamium.

6. CONIOCYBE, (*Ach.*) Apothecia stipitate, spherical, suberose, immarginate; asci evanescent; spores globose, unilocular, pale yellow; displayed in a naked, pulverulent mass on the apex of the stipe.

DIV. 2. ANGIOCARPI, (*Fries.*)

Apothecia normally closed, subglobose, nucleiferous; nucleus enveloped in a simple or compound tunic, either entirely formed of the thallus, or distinct; perforated at the apex by a simple pore, or irregularly dehiscent.

TRIBE 1. SPHÆROPHORACEÆ, (*Fries.*)

Thallus vertical, fruticulose. Apothecia formed of the swollen extremities of the thallus, closed, at length irregularly lacerato-dehiscent; nucleus subglobose.

GEN. 1. SPHÆROPHORON, (*Pers.*) Apothecia terminal, spherical; nucleus globose, or globoso-depressed, floccoso-cartilaginous, bluish-black; asci elongato-cylindrical, 8 spored; spores oblong, or globose, unilocular, normally bluish-black. Thallus fruticulose.

TRIBE 2. ENDOCARPEÆ (*Fries.*)

Thallus horizontal, foliaceous, squamulose, or squamuloso-crustaceous. Apothecia at first entirely imbedded and enclosed in the thallus; nucleus globose, enveloped in a thallodal, or a proper membranaceous tunic, becoming, at length, slightly elongated into an obtuse neck, prominent, and eventually perforated by a minute, regular pore.

GEN. 1. ENDOCARPON, (*Hedw.*) Apothecia imbedded in the thallus, globose; nucleus pale, gelatinous, enveloped in a membranaceous pale tunic; asci subclavate, 8 spored; spores elliptical, or elliptical-oblong, unilocular, uncoloured. Thallus cartilagineo-foliaceous, or squamulose.

2. NORMANDINA, (*Nyl.*) "Apothecia very rarely produced, solitary, subglobose, enclosed in the thallus; asci clavæform, 8 spored; spores oblongo-cylindrical, 8 locular, pale yellow." Thallus squamulose; squamules thin, rotundato-discoid.

3. DERMATOCARPON, (*Esch.*). Apothecia solitary, globose, or subglobose, at first enclosed in the thallus, afterwards partly emersed; asci obovato-clavate, or obovato-subventricose, 2 or 8 spored; spores oblong or elliptical, muriform-multilocular, pale yellowish-brown. Thallus squamuloso-crustaceous.

4. DECAMPIA, (*Massal.*) Apothecia solitary, ampullæform, immersed in the thallus, the apices at length prominent, and perforated; nucleus pale, gelatinous, enveloped in a carbonaceous perithecium; asci elongato-cylindrical, 8 spored; spores uniserial, subelliptical, or broadly fusiform, slightly constricted in the middle, normally quadrilocular, dark bright-brown. Thallus subtartareous, lobulato-effigurate.

TRIBE 3. PERTUSARIEÆ, (*Kbr.*)

Thallus membranaceo-crustaceous, uniform. Apothecia verrucæform, formed of the thallus; each verruca containing one or more subglobose waxy-gelatinous nuclei, which are enveloped in a distinct, proper membranaceous tunic; ostiolum slightly depressed and perforated by a regular pore, or irregularly dehiscent.

GEN. 1. PERTUSARIA, (*DC.*) Apothecia verrucæform, normally covered by the cortical stratum of the thallus; each verruca containing one or more gelatinous nuclei; asci elongato-cylindrical or clavato-saccate, 1, 2, 4, 6, or 8 spored; spores very large, elliptical, or elliptical-oblong, unilocular, pale yellow, or yellowish-brown, each enclosed in a hyaline double membrane. Thallus crustaceous.

2. Thelotrema, (*Ach.*) Apothecia solitary, superficial, verrucæform, formed of the thallus, at first closed, afterwards open pseudo-urceolate, each verruca containing a deeply-sunken nucleus, enveloped in a proper membranaceous tunic; asci clavato-cylindrical, 4 spored; spores subfusiform, submuriform-multilocular, pale yellow. Thallus cartilagineo-crustaceous.

3. Petractis, (*Fries.*) Apothecia solitary, verrucæform, semi-immersed, depresso-globose; nucleus enveloped in a double receptacle; the external one, formed of the hypothallus, at first closed, afterwards stellato-fissured; the internal one, subceraceous, yellow, semi-opaque, at first closed, afterwards irregularly lacerated; the nucleus finally becoming pseudo-disciform; asci elongato-clavate, 8 spored: spores broadly fusiform, quadrilocular, uncoloured. Thallus crustaceous, uniform.

4. Phlyctis, (*Wallr.*) Apothecia maculæform-difformed, solitary, or aggregated, at first immersed in thallodal verrucæ, closed, afterwards irregularly dehiscent, and finally pseudo-disciform; asci oblongo-clavate, 1, 2, or 3 spored; spores elliptical-oblong, with a minute hyaline papillæform appendage attached to each extremity, muriform-multilocular, pale yellowish-brown. Thallus crustaceous, eventually pulverulent.

Tribe 4. Verrucarieæ, (*Fries.*)

Thallus crustaceous, uniform. Apothecia verrucæform, solitary, distinct from the thallus, innato-sessile, hemispherical, or globose; perithecium, for the most part corneo-carbonaceous, black; ostiolum usually slightly depressed, and when mature, perforated by a regular pore; nucleus globose, subhyaline.

Gen. 1. Sphæromphale, (*Rchb.*) Apothecia solitary, conico-hemispherical, or globose; asci saccato-clavate, or oblongo-ventricose, 2 or 8 spored; spores elliptical-oblong, or ovate, muriform-multilocular, varying in colour from pale yellowish-green to dark brown, or nearly black.

2. Segestrella, (*Fries.*) Apothecia solitary; perithecium, ceraceo-membranaceous, coloured; paraphyses distinct; asci subclavate, 8 spored; spores fusiform, quadrilocular, uncoloured.

3. Verrucaria, (*Wigg.*) Perithecium corneo-carbonaceous; nucleus gelatinous, fluid or deliquescing, subhyaline; paraphyses for the most part indistinct; asci oblongo-clavate, 8 spored; spores oblong, or elliptical-oblong, unilocular, pale yellow, or uncoloured. Thallus crustaceous, uniform.

4. Thelidium, (*Massal.*) Asci ovato-oblong, or elongato-cylindrical, 4 or 8 spored; spores elliptical, or elliptical-oblong, bilocular, or quadrilocular, varying in colour from white to yellowish-brown. Thallus crustaceous, or athalline.

5. Pyrenula, (*Ach.*) Asci elongato-clavate, 8 spored; spores elliptical-oblong, quadrilocular, each loculus containing an angular or rounded

nucleus, pale or dark brown. Thallus crustaceous, membranaceo-cartilagineous, uniform.

6. Arthopyrenia, (*Massal.*) Asci clavato-lanceolate, or ovato-oblong, 8 spored; spores acicular, fusiform, or linear-oblong, 2, 4, 6, or 8 locular, uncoloured. Thallus membranaceo-crustaceous, often indistinct.

7. Microthelia, (*Kbr.*) Asci oblongo-clavate, or elongato-cylindrical, 8, or from 32 to 50 spored; spores elliptical, oblong, or oblongo-subfusiform, bilocular, or quadrilocular, varying in colour from pale brown to dark red. Thallus crustaceous, or athalline.

8. Strigula, (*Fries.*) Asci 8 spored; spores subcymbiform, quadrilocular, uncoloured. Thallus filmy, mostly produced beneath the cuticle, and its presence indicated by a greyish colouration. Species epiphylla; parasitic on coriaceous perennial leaves.

FAM. 1. COLLEMACEÆ, (*Nyl.*)

Thallus cartilaginous, coriaceous, or membranaceous in a dry state; more or less distended, turgid, and gelatinous when wet; in form polymorphous, lobed, lacerated, or branched; varying in colour from pale-green to dark-olive, brown, or black, rarely grey or glaucous. Internal anatomic elements indistinctly stratified; cortical stratum reduced to that of a thin cellular, or noncellular epithallus; gonidiac granules, moniliform-coherent, agglomerated, or simple, imbedded and disposed in various modes in an uncoloured gelatinous substance, very greedy of water; medullary, composed of hyaline filaments, or cells. Apothecia either globose, nucleiferous; or disciform, thalamiferous.

DIV. 1. ANGIOCARPI, (*Fries.*)

Apothecia closed, globose, nucleiferous, the apex at length perforated with a simple pore.

TRIBE 1. LICHINACEÆ.

Thallus cæspitoso-fruticulose, or cæspitoso-filamentose; epithallus cellular, or noncellular. Apothecia globose, or ovate; nucleus enveloped by a thallodal receptacle.

GENUS 1. LICHINA, (*Ag.*)

Apothecia terminal, globose, enveloped by a thallodal receptacle, the apex at length perforated with a regular pore, which eventually becomes somewhat dilated; nucleus gelatinous, pale; paraphyses very slender, capillaceous; asci elongato-cylindrical, 8 spored; spores uniserial, subelliptical, often somewhat tetragonal, unilocular, internally subgranular, uncoloured. Thallus cartilaginous, fruticulose, dichotomously branched. Internal elements composed of a noncellular epithallus, rather small bluish-green gonidiac granules, principally disposed beneath the epithallus, and of elongated, hyaline, parallel linear-cells, which constitute the medullary.

1. LICHINA PYGMÆA, *Ag.* Thallus cartilaginous, cæspitoso-fruticulose, repeatedly and dichotomously branched, greenish-black; branches erect, compressed, the apices obtuse. Apothecia terminal, globose; their apices at length perforated, and eventually more or less dilated; asci elongato-cylindrical, 8 spored; spores elliptical, or subelliptical, unilocular, internally subgranular, subhyaline; ·005 in. long, by ·0025 in. broad. *Plate* 1, *fig* 1.

Lichina pygmæa, Ag. Sp. Alg. 1.105.—Hook. Brit. Fl. 2.270.—Leight. Exs. 260!—Hepp. Eur. 423!—Nyl Syn. Lich. 91. t. 2. f 16. —*Fucus pygmæus*, Sm. E. Bot. 1332.

On the sea coast, upon rocks which are more or less exposed to the action of the tide. Ardglass! Co. Down, Ireland, *Dr. Maingay,* Torquay! Devonshire, *Rev. W. A Leighton,* Cullercoats Pier, Northumberland, *I. G. Baker, Esq.,* Huntcliff, Cleveland, Yorkshire.

2. Lichina confinis, *Ag.* Thallus cartilaginous, cæspitoso-fruticulose, repeatedly and dichotomously branched, olive, or greenish-black; branches round, erect, subfastigiate. Apothecia and spores as in the preceding species.

Lichina confinis, Ag. Sp. Alg. 105.—Hook. Brit. Fl. 2.270.—Kbr. S. L. G. 430.—Nyl. Syn. Lich. 92.—*Lichen confinis,* Sm. E. Bot. 2575.

On the sea coast, upon rocks which are covered only at high tides. Co. Down! Ireland, *Dr. Maingay.* Near Cork! *I. Carroll, Esq.* Distinguished from *L. pygmæa,* by being rather smaller in size, and by having the segments of its thallus rounded.

Genus 2. Ephebe, (*Fries.*)

"Apothecia very minute, inclosed in swollen ovate, or subelliptical portions of the thallus; spores very minute, oblong, unilocular, uncoloured." Thallus cæspitoso-filamentose, divaricatedly branched; branches very slender, somewhat capillary. Epithallus distinctly cellular; gonidiac granules large, 2 to 4, or more, aggregated together.

1. Ephebe pubescens, (*Fries.*) Thallus cæspitose, decumbent, black, divaricatedly branched; branches round, entangled, very slender, the apices capillary. Apothecia and spores as above.

Ephebe pubescens, Fries, S. O. V. 356.—Nyl. Syn. Lich. 90. L. P. 1!—*Cornicularia pubescens,* Ach. L. Univ. 610.—*Collema pubescens,* Schær. Enum. 248.—*Stigonema atrovirens,* Ag. Syst. Alg. 42.—Hook. Brit. Fl. 2. 363.—*Lichen pubescens,* Sm. E. Bot. 2318.

On wet or damp shady rocks in subalpine ravines. Eglestone! Durham, *Rev. J. Harriman.* Glengariff! *I. Carroll, Esq.* A minute species, consisting of filiform variously branched filaments, loosely aggregated together, of a dark brown or black colour; appearing to the eye, when dry, rigid, brittle, and slightly shining; when wet, and seen beneath the microscope, of a rich dark brown colour, soft and somewhat gelatinous, exhibiting the large gonidiac granules very distinctly, through the thin cellular epithallus.

DIV. 2. GYMNOCARPI, (*Fries.*)

Apothecia normally open, disciform; thalamium contained in a thallodal exciple, or a proper exciple, and margined by it.

Tribe 1. Spilonemeæ.

Thallus fruticuloso-filamentose, very minute; epithallus unequally cellular; gonidiac granules arranged in transverse series. Apothecia subpatellæform.

Genus 1. Spilonema, (*Born.*)

Apothecia lentiform, black, immarginate; thalamium arising from a brownish-black, simple hypothecium; paraphyses articulated, their apices blackish; asci oblongo-clavate, 8 spored; spores oblong, unilocular, uncoloured. Thallus fruticulose, very minute; branches cylindrical, entangled. Internal gonidiac granules, arranged in transverse series; epithallus unequally cellular.

1. SPILONEMA PARADOXUM, (*Born.*) Thallus fruticuloso-subfilamentose, dark-brown or brownish-black; branches cylindrical, very minute, entangled, subsecund, the apices attenuated. Apothecia lentiform, black, immarginate; asci 8 spored; spores very minute, unilocular, hyaline.

Spilonema paradoxum, Born. Trois. Lich. Nouv. p. 4. t. 1 et 2.—Leight. Exs. 347!—Nyl. Syn. Lich. 89. t. 2. fig. 3.

On calcareous, and schistose rocks, in alpine districts. Barmouth! North Wales, *Rev. W. A. Leighton.* A very minute species, bearing considerable resemblance, in its external aspect, to *Ephebe pubescens*, but distinguished from it by being rather smaller in size, less branched and entangled, and of a paler colour, and also by the form of its apothecia.

TRIBE 2. COLLEMEÆ.

Thallus cartilaginous, coriaceous, or membranaceous, variously lobed and laciniated, more or less rigid when dry; gelatinous, distended and turgid when wet; gonidiac granules simple, or moniliform-coherent; epithallus noncellular. Apothecia scutelliform, margined by a thallodal exciple.

GENUS 1. SYNALISSA, (*Fries.*)

Apothecia depresso-subscutelliform, at first closed, coarctate, at length dilated, margined by a thallodal exciple; thalamium arising from a dull yellow simple hypothecium; asci subclavate, 8 to 24 spored; spores elliptical or subspherical, unilocular, uncoloured. Thallus pulvinate, or subcrustaceous, slightly lobed. Epithallus noncellular; gonidiac granules mostly simple, irregularly disposed and imbedded in an uncoloured gelatinous substance; medullary elements, consisting of elongated and branched, hyaline filaments.

1. SYNALISSA SYMPHOREA, (*DC.*) Thallus pulvinate, when dry coriaceo-cartilaginous, black; when wet, soft, and somewhat gelatinous, digitately divided; branches very short, erect, rounded and somewhat twisted, the apices obtuse. Apothecia minute, terminal, sessile; disc coarctate, at length dilated, of nearly the same colour as the thallus, surrounded by a tumid thallodal margin; asci subclavate, 8 to 24 spored; spores elliptical or nearly spherical, unilocular, hyaline; ·00125 in. in diameter. PLATE 1. *fig.* 2.

Collema symphoreum, DC. Fl. Fr. 2. 382.—*Collema synalissum*, Ach. L Univ. 640.—*Collema stygium*, ε. *incisum*, Schær. Enun. 260.—*Synalissa Acharii*, Hepp. Eur. 89!—*Synalissa ramulosa*, Kbr. S. L. G, 423.—*Synalissa symphorea*, Nyl. Syn. Lich. 94.—*Synalissa vulgaris*, Thwaites, in Ann. and Mag. N. H. 3. p. 219. ser. 3

On calcareous rocks in the vicinity of the sea. St. Vincent rocks! near Bristol. *W. Thwaites, Esq.* Babbicombe! *Rear Admiral Jones.*

Genus 2. Collema, (*Hoffm.*)

Apothecia at first closed, becoming scutelliform, margined by a thallodal exciple; thalamium arising from a simple, or double hypothecium, the superior gelatinous, inferior cellular; asci variously clavæform, 4 to 8 spored; spores oblong, elliptical-oblong, or ovate, from quadrilocular becoming irregularly muriform-multilocular, pale yellow, or subhyaline. Thallus cartilaginous, coriaceous, or membranaceous when dry; soft and pulposo-gelatinous when wet; variously lobed. Epithallus noncellular; gonidiac granules simple or moniliform-coherent, variously disposed; medullary elements consisting of, more or less elongated, simple or branched, hyaline filaments.

*1. Collema tunæforme, (*Ach.*) Thallus membranaceo-foliaceous, somewhat rugose, blackish-green, besprinkled with fuliginous powder; lobes oblong, deeply cut, sinuato-lacinated, obtuse, flexuose and crisped, subcrenate. Apothecia sessile, scattered; disc plane, brown, surrounded by an entire thallodal margin; spores. . . . . . ?

Collema tunæforme, Ach. Syn. 322.—Hook. Brit. Fl. 2. 211.

On calcareous rocks in alpine districts. Walls near Kendal! infertile, *S. Hailstone, Esq.* Whether the present is a really distinct species, or only a state of *Synechoblastus flaccidus*, from the small specimen at my disposal, and that infertile, I am unable to say.

2. Collema furvum, (*Ach.*) Thallus membranaceous, roundly lobed, granulated on both sides, dark-olive; lobes variously deformed, undulated and crisped. Apothecia of a medium size, sessile, scattered; disc plane, from dark-brown becoming nearly black, surrounded by an entire thallodal margin; "asci elongato-clavate, 8 spored; spores subelliptical, from quadrilocular becoming irregularly muriform-multilocular, uncoloured."

Lichen furvus, Ach. Prod. 132.—*Lichen granulatus*, Sm. E. Bot. 1757.—*Collema furvum*, Ach. Syn. 323.—Kbr. S. L. G. 406.—Nyl. Syn. Lich. 107.—Hepp. Eur. 414!—*Collema granulatum*, Hook. Brit. Fl. 2. 211.

On the ground, and old walls, mossy rocks, etc., in shady situations. Shanklin! *Rev. T. Salwey.* Bolton Woods! and Ingleborough! *Dr. Carrington.* Abundant on old mossy walls about Frosterley! and Stanhope! Wear Valley, Durham.* Although I have collected and seen this species growing in great abundance, I have never seen its apothecia. In its external aspect, it bears a considerable resemblance to *S. faccidus;* but from which, in an infertile state, it may be distinguished by its thicker, more complicated, and granulated thallus; and in a fertile one, by its differently shaped spores.

3. Collema dermatinum, (*Borr.*) Thallus coriaceo-membranaceous, roundly lobed, smooth or slightly granulated, dark olive-green; pulposo-gelatinous when wet; olive-brown and rigid when dry; lobes suberect,

---

* N.B.—All localities inserted without the Collector's name, are given on my own authority, having gathered specimens myself at the places mentioned; and wherever the ! occurs, it is to denote that I have examined specimens from the specified localities, or [illegible]

crowded and imbricated in the centre, more or less depressed at the circumference; margins inciso-crenate. "Apothecia sessile (rarely present); disc plane, reddish-brown, surrounded by an elevated, entire thallodal margin;" spores. . . . . . ?

Collema dermatinum, Borr. in E. Bot. Suppl. 2716. f. 2.—Hook. Brit. Fl. 2 212.—*Collema granosum*, γ. *dermatinum*, Schær. Enum. 253.

On the ground, also on calcareous rocks Near the Black rock! sterile, Clifton, Bristol. *Miss M. Atwood.* The specimens from the above locality agree, so far as the thallus is concerned, with the figure in English Botany; what the spores may be, I am unable to say, having never seen fructified specimens. According to Nylander, *Collema dermatinum* of Acharius is synonymous with *Leptogium tremelloides*; be this as it may, *our* plant is a true *Collema*.

4. COLLEMA MELÆNUM, (*Ach.*) Thallus coriaceo-cartilaginous, suborbicular, radiato-laciniated, olive-black when dry, greenish-black and turgid when wet; laciniæ more or less elongated, rather broad and somewhat imbricated, the margins elevated, undulated, entire, or crisped and crenate. Apothecia of a medium size, sessile, or slightly elevated, submarginal; disc nearly plane, reddish-brown, surrounded by a somewhat granulated margin; asci elongato-clavate, 8 spored; spores oblongo-ventricose, or elliptical-oblong, from quadrilocular becoming irregularly muriform-multilocular, pale yellow, or subhyaline; ·005 to ·007 in. long, by ·0025 to ·0035 in. broad.

Collema melænum, Ach. Syn. 315.—Nyl. Syn. Lich. 108. *Collema multifidum*, Schær. Enum. 254. Kbr. S. L. G. 409.

β. MARGINALE, (*Huds.*) Thallus elongato-laciniated; laciniæ narrow, imbricato-lobulate, smooth, canaliculate; margins crisped and crenate. Apothecia elevato-sessile, marginal; disc concave, becoming nearly or quite plane, dark reddish-brown, surrounded by a prominent, entire thallodal margin; asci as above; spores very variable in size, ·004 to ·007 in. long, by ·00175 to ·00275 in. broad; in all other respects as above.

Lichen marginalis, Huds. Angl. 534.—Sm. E. Bot. 1924.—*Collema marginale*, Hook. Brit. Fl. 2. 210.—*Coll. multifidum*, β. *marginale*, Schær. Enum. 255, L. H., 420!—Kbr. S. L. G. 409,

γ. JACOBÆIFOLIUM, (*Schrank.*) Laciniæ lacero-pinnatifid, very narrow, canaliculate; otherwise as above.

Collema multifidum, γ. Schær. Enum. 255, L. H. 422!

On rocks, old walls, &c., in subalpine districts. Oswestry! *Rev. T. Salwey.* Malham! *S. Hailstone, Esq.* Bolton Woods! *Dr. Carrington.* Near Galway! Ireland, *D. Moore, Esq.* Wensleydale! *J. W. Watson, Esq.* Teesdale! Durham (common in Yoredale and the Craven district), *I. G. Baker, Esq.* Middleton! *I. Carroll, Esq.*

Nyl.!

5. COLLEMA FRAGILE, (*Tayl.*) Thallus coriaceo-membranaceous, minute, laciniato-lobed, dark olive-green when wet, olive-brown when dry; lobes radiating from a centre, short, linear, tumid; becoming ruguloso-granulose. Apothecia minute, innato-sessile, urceolate, at length nearly plane; disc pale brown, surrounded by a thick, entire, olive-brown, thallodal margin; asci 8 spored; spores subelliptical or ovate, irregularly muriform-multilocular, subhyaline; ·005 to ·006 in. long, by ·002 to ·00225 in. broad.

Collema fragile, Tayl. Fl. Hib. pt. 2. 109.—Schær. Enum. 259 — *Leptogium fragile,* Nyl. Syn. Lich. 120.

A very minute species, resembling young states of *Synechoblastus multipartitus,* but differs from it, in the form of its apothecia and spores. On limestone rocks, Dunkerron! *Dr. Taylor.*

6. COLLEMA PLICATILE, *(Ach.)* Thallus coriaceo-cartilaginous, orbicular, roundly-lobed, dark green and pulposo-gelatinous when wet, blackish-green when dry; lobes thick, undulato-plicate at the circumference, imbricated and ascending in the centre. Apothecia small, numerous, sessile; disc reddish-brown, concave, becoming nearly plane, surrounded by a thick, inflexed, entire thallodal margin; asci clavato-ventricose, 8 spored; spores oblongo-ventricose, their extremities round and obtuse, or attenuated, from quadrilocular becoming irregularly muriform-multilocular, subhyaline; ·006 to ·008 in. long, by ·0025 to ·003 in. broad.

Collema plicatile, Ach. Syn. 314.—Smith, E. Bot. 2348.—Hook. Brit. Fl. 2. 209.—Schær. Enum. 258.—Hepp. Eur. 86!—Kbr. S. L. G. 409.—Nyl. Syn. Lich. 109.

Upon wet rocks in subalpine and alpine districts. Guernsey! *Rev. T. Salwey.*

7. COLLEMA TURGIDUM, *(Ach.)* Thallus coriaceous, thick, roundly lobed, smooth or granulated, reddish-black when dry, gelatinous and dark-olive when wet; lobes turgid, ascendant and somewhat imbricated in the centre, concave undulated and plicate at the circumference. Apothecia of a medium size, sessile; disc plane, from reddish-brown becoming nearly black, surrounded by a thick, turgid, and more or less granulated margin; asci clavate, 8-spored; spores oblong, or ovato-oblong, quadrilocular, generally a little constricted opposite the dissepiments, subhyaline; ·004 to ·006 in. long, by ·00125 to ·0025 in. broad.

Collema turgidum, Ach. L. Univ. 634.—Hook. Brit. Fl. 2. 209.—Schær. Enum. 258, L. H. 433!—Hepp. Eur. 215!—Leight. Exs. 257!

Upon rocks and old walls, in damp shady situations. Near Scarborough! *S. Hailstone, Esq.* Upton, near Shiffnal! Shropshire, *Rev. W. A. Leighton.* Malham! Yorkshire, *Dr. Carrington.*

·8. COLLEMA PULPOSUM, (*Bernh.*) Thallus coriaceous, thick, lobed and imbricated, greenish-black and wrinkled when dry, olive-green and pulposo-gelatinous when wet; lobes nearly entire, or repando-crenate, suberect in the centre, larger and more depressed at the circumference. Apothecia large, sessile; disc brown, at first concave, afterwards plane, and eventually slightly convex, surrounded by a thickish entire margin; asci subclavate, 8 spored; spores oblong, or ovato-subpyriform, quadrilocular, becoming irregularly muriform-multilocular, subhyaline, or pale yellow; ·005 to ·0055 in. long, by ·00125 to ·002 in. broad. PLATE 1, *fig.* 3.

Lichen pulposus, Bernh. Schrad. Journ. 1799. 1. p. 7. t. 1. fig. 1.—*Collema pulposum,* Ach. Syn. 311.—Leight. Exs. 290!—Hepp. Eur. 417!—Nyl. Syn. Lich. 109.—*Coll. cristatum,* Hook. Brit. Fl. 2. 208, in pt.—*Coll. pulposum,* α. Schær. Enum. 259, L. H. 428! et 429!—Kbr. S. L. G. 404, in pt.

β. GRANULATUM, (*Swartz.*) Lobes of the thallus thick, bullatogranulated, erect in the centre, radioso-plicate at the circumference; margins crenate. Apothecia sessile, disc plane, reddish-brown, surrounded by a granuloso-crenulated margin; spores as above.

Lichen granulatus, Swartz.—*Coll. pulposum, β. granulatum*, Kbr. S. L. G. 405.—Hepp. Eur. 418!

γ. LIMOSUM, (*Ach.*) Lobes of the thallus thinnish, small, scattered, entire, or slightly crenate, green and pulposo-gelatinous when wet, dark olive when dry, often evanesent. Apothecia appressed, at length slightly elevated; disc plane, reddish-brown, surrounded by a somewhat prominent, entire, or slightly crenated margin; asci elongato-clavate, 8 spored; spores oblong, or oblongo-obovate, quadrilocular, becoming irregularly muriform-multilocular, pale-yellow; ·005 to ·007 in. long, by .0015 to ·00275 in. broad.

Collema limosum, Ach. Syn. 309.—Hook. Brit. Fl. 2. 208.—Borrer in E. Bot. Suppl. 2704. f. 1.—Leight. Exs. 105!—Nyl. Syn. Lich. 110.

δ. CRISTATUM, (*Borr.*) Thallus thinnish, roundly lobed and somewhat imbricated, olive-black, or dark olive-green when dry, green and pulposo-gelatinous when wet; lobes granulated, nearly erect in the centre, depressed and more dilated at the circumference; margins inciso-crenulated, often somewhat palmate. Apothecia sessile; disc at first concave, afterwards plane, varying in colour from brown to reddish-chestnut, surrounded by a prominent, entire, or granulato-crenated thallodal margin; asci subclavate, 8 spored; spores oblong, or oblongo-obovate, quadrilocular, often becoming irregularly muriform-multilocular, subhyaline, or pale-yellow; ·004 to ·006 in. long; by ·0015 to ·00275 in. broad.

Collema cristatum, Borr. in Hook. Brit. Fl. 2. 208, in pt.—Leight. Exs. 106!—*Lichen crispus*, Sm. E. Bot. 834,—*Collema multiflorum*, α. et β. Hepp. Eur. 87! et 88!—*Collema crispum*, Nyl. Syn. Lich. 110.

On wet clayey banks among mosses, and sometimes about the roots of trees; common. The four forms here described, are considered by several authors, as will be seen from the synonyms, as so many distinct species. But they have always appeared to me to be extreme forms of one variable species, dependent upon local circumstances for the different aspects which it assumes. A somewhat evanescent thallus, and appressed apothecia, have generally been considered as the distinctive characters of *C. limosum*,—a thick pulposo-gelatinous and variously lobed thallus, and prominent apothecia, surrounded by an entire margin, of *C. pulposum*,—a thinner thallus, variously lobed, more dilated at the circumference, and granulated in the centre, and sessile reddish-chestnut apothecia, surrounded by a granulato-crenulated margin, of *C. cristatum*, Borr.,—and a thick granulated, mostly sterile thallus, of *C. granulatum*, Swartz. Had these characters been constant and permanent, they might have been considered valuable; but when specimens are found possessing intermediate characters, and those of frequent occurrence, the above definitions ought to be understood as applicable in a general sense only. Seeing the close connection that exists between these forms, and their evident relationship, I think it preferable and more in accordance with nature, to arrange them as varieties of one species. Their spores also bear a general resemblance to each other.

9. COLLEMA TENAX, *Swartz.* Thallus thin, subcoriaceo-membranaceous, sinuato-lobed and imbricated, smooth, glaucous-green; when wet pulposo-

gelatinous, green; lobes rounded, the margins somewhat palmate, or inciso-crenate, obtuse. Apothecia of a medium size, at first depressed, afterwards sessile; disc plane, reddish-brown, surrounded by an entire margin; asci elongato-clavate, 8 spored; spores oblong, or obovate, quadrilocular, internally granular, pale-yellow; ·004 to ·005 in. long, by ·00175 to ·00225 in. broad.

Collema tenax, Swartz. Act. Ups. 4. 249 —Ach. Syn. 314.—Hook. Brit. Fl. 2. 209.—Schær. Enum. 254, L. H. 427 !—Kbr. S. L. G. 404. —*Lichen tenax*, Smith. E. Bot. 2349.

On the ground, among mosses in alpine districts. Oswestry! *Rev. T. Salwey.*

10. Collema crispum, *Borr.* Thallus suborbicular, thinnish, variously sinuated and lobed, dark olive-green when wet, olive-black when dry; lobes erect in the centre and very much crowded and aggregated together, those of the circumference somewhat depressed and more dilated; margins granulato-crenulated. Apothecia rather large, subinnato-sessile; disc concave, olive-brown, surrounded by a thin granulato-crenulated thallodal margin; asci elongato-clavate, 8 spored; spores oblongo-ventricose, or oblongo-obovate, quadrilocular, becoming irregularly muriform-multilocular, subhyaline; ·005 to ·007 in. long, by ·002 to ·00275 in. broad.

Collema crispum, Borr. in E. Bot. Suppl. 2716. f. 1.—Hook Brit. Fl. 2. 212.—Leight. Exs. 346 !

Upon the ground in moist sandy situations. Coatham marshes! near Redcar, Cleveland, Yorkshire. Easily distinguished from the other species, by the constant and remarkably granulato-crenulated margins of the thallus and apothecia.

11. Collema cheileum, (*Ach.*) Thallus submembranaceous, imbricato-lobed, dark olive when wet, nearly black when dry; lobes minute, rounded, ascending, the margins entire or inciso-crenate. Apothecia of a medium size, somewhat depressed, sessile; disc plane, reddish-brown, surrounded by a granulato-crenulated margin; asci elongato-clavate, 8 spored; spores elliptical-oblong, or oblongo-ventricose, quadrilocular, often becoming celluloso-multilocular, pale yellow; ·006 to ·008 in. long, by ·0025 to ·003 in. broad. Plate 1. *fig.* 4.

Collema cheileum, Ach. Syn. 310.—Hook. Brit. Fl. 2. 208.—Kbr. S. L. G. 402.—Nyl. Syn. Lich. 111, L. P. 4 !—*Coll. crispum, var. furfuraceum*, Schær. Enum. 257, L. H. 426 !

On the mortar of old walls, calcareous rocks, &c., common.

12. Collema fluviatile, (*Huds.*) Thallus coriaceo-membranaceous, lobed and rather loosely imbricated, dark olive when wet, olive-black when dry; lobes oblong or obovate, simple or proliferous, upper side convex and often granulated, under side concave or subcanaliculated; margins entire, or slightly crenate. Apothecia small, globular, lateral, sessile; disc concave, brown, surrounded by a smooth pale thallodal margin; asci elongato-subcylindrical, 8 spored; spores oblongo-ventricose, or obovato-subpyriform, quadrilocular, becoming irregularly muriform-multilocular, pale yellow; ·007 to ·009 in. long, by ·0025 to ·0035 in. broad.

Lichen fluviatilis, Huds.—Sm. E. Bot. 2039.—*Collema fluviatile*, Ach. Syn. 314.—Hook. Brit. Fl. 2. 209.

On calcareous rocks, in the stream near its source, at Malham Cove! Yorkshire, *I. G. Baker, Esq.* River Isla! *I. Carroll, Esq.*

13. COLLEMA CERANOIDES, (*Borr.*) Thallus membranaceo-subgelatinous, cæspitose, erect, or ascending, laciniato-lobed, brownish-olive, or greenish-black; lobes somewhat linear at the base, dilated upwards, densely crowded, imbricated, repeatedly divided, and terminated by numerous erect, fastigiate, crowded, elongato-cylindrical obtuse laciniæ. Apothecia (rarely produced) minute, sessile on the lobes, scattered; disc at first a little concave, afterwards plane, pale brown, surrounded by a thin smooth thallodal margin, which, when old, becomes granular; asci elongato-clavate, 4 spored; spores broadly oblong, quadrilocular, or irregularly muriform-multilocular, pale yellow; ·006 to ·007 in. long, by ·0035 to ·004 in. broad.

Collema ceranoides, Borr. in E. Bot. Suppl. 2704. fig. 2.—Hook. Brit. Fl. 2. 209

On the ground, forming small pulvinate patches, from a quarter to half an inch in thickness, but rarely producing its apothecia. Ben Lawers, fertile! *Admiral Jones.* Guernsey! infertile, *Rev. T. Salwey.* In all the apothecia that I have examined the asci were of an elongato-clavate figure, each constantly containing *four* spores, of the form and structure above described. This peculiarity at once distinguishes it from all the forms of *Coll. pulposum*, with which it has in all probability frequently been confounded, and from every other species of the present genus.

14. COLLEMA MICROPHYLLUM, *Ach.* Thallus submembranaceous, imbricato-lobed, olive-green and pulposo-gelatinous when wet, olive-black when dry; lobes densely crowded, minute, very much divided, the ultimate segments rounded and granulato-crenulated, the circumferencial ones slightly dilated. Apothecia minute, sessile, scattered, or crowded; disc concave, becoming nearly plane, reddish-brown, surrounded by an incurved entire margin; asci elongato-clavate, 8 spored; spores elliptical-oblong, quadrilocular, becoming irregularly muriform-multilocular subhyaline: ·005 to ·006 in. long, by ·002 to ·003 in. broad.

Collema microphyllum, Ach. Syn. 310.—Borr. in E. Bot. Suppl. 2721. —Hook. Brit. Fl. 2. 207.—Kbr. S. L. G. 406.—Hepp. Eur. 214!—Leight. Exs. 258!—Nyl. L. P. 3! Syn. Lich. 113. (exclude *Lichen fragrans*, Sm. E. Bot. 1912).—*Coll. nigrescens*, var. *microphyllum*, Schær. Enum. 252, L. H. 411!

On the trunks of old elms in shady situations. Near Exeter! Devonshire, *Mr. E. Parfitt.* Ingleby Park! Cleveland, Yorkshire.

* 15 COLLEMA? EPIPHYLLUM, *Leight.* Thallus squamulose, dark-olive, membranaceo-subcartilaginous when dry, gelatinous when wet; scales at first minute, distantly scattered, rounded, afterwards stellately or palmately divided, appressed, the extremities obtuse. Apothecia. . . . . ?

Collema? epiphyllum, Leight. Exs. 103!

On Laurel leaves, Gopsall! Leicestershire, ex herb. *Rev. W. A. Leighton.* On Ivy leaves, Colin Glen! near Belfast, *Professor Dickie.*

I greatly doubt the claim of the present curious little plant to a place among the Lichens; in fact it is solely on account of the absence of apothecia, that I admit it even thus temporarily, as it is probable that further and more extended researches will establish its nearer relationship to the *Algæ*, or *Fungi*.

GENUS 3. SYNECHOBLASTUS, (*Trevis*).

Apothecia at first closed, afterwards scutelliform, margined by a thallodal exciple; thalamium thin, arising, for the most part, from a double hypothecium; paraphyses lax; asci clavæform, 8 spored; spores acicular, elongato-fusiform, or linear-oblong, straight, curved, or flexuose, quadrilocular, or from quadrilocular becoming multilocular, but never *muriform*, loculi constantly uniserial, subhyaline or hyaline. Thallus cartilaginous, coriaceous, or membranaceous when dry, gelatinous when wet, variously lobed. Epithallus noncellular.

1. SYNECHOBLASTUS FLACCIDUS, (*Ach.*) Thallus membranaceo-foliaceous, broadly lobed, blackish-green; lobes thin, flaccid, somewhat ascending, rounded, undulato-plicate, smooth, or slightly granulated, the margins entire, or subcrenate. Apothecia of a medium size, sessile, scattered; disc plane, reddish-brown, or nearly black, surrounded by an entire thallodal margin; asci clavate, 8 spored; spores clavate, or broadly oblongo-fusiform, quadrilocular, often becoming 6-locular, hyaline, or pale-yellow; ·006 to ·008 in. long, by ·00125 to .00175 in. broad.

Lichen flaccidus, Ach. Prod.—Smith, E. Bot. 1653.—*Coll. flaccidum*, Ach. Syn. 322.—Hook. Brit. Fl. 2. 211.—Leight. Exs. 345!—Nyl. Syn. Lich. 107.—*Coll. rupestre, α. flaccidum*, Schær. Enum. 252, L. H. 412!—*Synechoblastus flaccidus*, Kbr. S. L. G. 413.

On rocks and old walls, also on the ground, about the roots of trees. Barmouth! North Wales, *Rev. W. A. Leighton.* Sidmouth! *Rev. T. Salwey.* Face of Kinnoull Hill! Perth, *Dr. Lindsay.* Bolton Woods! *Dr. Carrington.* Near Exeter! fertile, *Admiral Jones.* Rievaulx! Yorkshire, *I. G. Baker, Esq.* Distinguished from *S. nigrescens*, by its thin membranaceous thallus, and large broadly-fusiform spores.

2. SYNECHOBLASTUS NIGRESCENS, (*L.*) Thallus membranaceo-foliaceous, broadly and roundly lobed, rugoso-plicate, blackish-green when dry, dull olive-green and flaccid when wet; lobes naked, or furfuraceo-granulated, ascending in the centre, depressed at the circumference; margins entire, or slightly crenate. Apothecia small, crowded, sessile; disc from concave becoming plane, reddish-brown, surrounded by a thin entire thallodal margin; eventually convex, the margin more or less obliterated; asci subclavate, 8 spored; spores elongated, fusiform or acicular, curved or flexuose, 4-10 locular, subhyaline, or hyaline; ·014 to ·015 in. long, by ·001 in. broad. PLATE 1, *fig.* 5.

Lichen nigrescens, L. Suppl. Pl. 451.—E. Bot. 345.—*Collema nigrescens*, Ach. Syn. 321.—Hook. Brit. Fl. 2. 211.—Nyl. Syn. Lich. 114.—*Coll. nigrescens, α. vespertilio*, Schær. Enum. 252, L. H. 410!—Leight. Exs. 104!—*Synechoblastus vespertilio*, Kbr. S. L. G. 414.—Hepp. Eur. 216!

On the trunks of trees in damp shady woods. Near Ryde! Isle of

Wight, *Rev. T. Salwey.* Devonshire! *Admiral Jones.* Near Ripon! Yorkshire, *W. Brunton, Esq.* Near Cork! Ireland, *I. Carroll, Esq.* Flazendale and Teesdale, *I. G. Baker, Esq.* Near Guisbro'! Cleveland, Yorkshire.

3. SYNECHOBLASTUS AGGREGATUS, (*Ach.*) Thallus membranaceous, lobed and plicate, rigid, deformed, greenish-black; lobes rather short, the margins crenate and often granuloso-crisped. Apothecia of a medium size, sessile, numerous and more or less crowded; disc plane, or at times slightly convex, red, or pale reddish-brown, surrounded by a thin, entire, or somewhat granular, thallodal margin; asci subclavate, 8 spored; spores cylindrico-fusiform, straight, or variously curved, 4-10 locular, subhyaline or hyaline; ·014 to ·018 in. long, by ·001 in. broad.

Collema fasciculare, var. aggregatum, Ach. Syn. 317.—*Coll. aggregatum,* Nyl. Syn. Lich. 115.

On trunks of trees, rocks, stones, &c., among mosses. Henfield! Sussex, *Admiral Jones.* Killarney! Ireland, *D. Moore, Esq.* Resembling *S. nigrescens,* in its general aspect and habit, but is distinguished from it, by the more rigid nature of its thallus, smaller and more deformed lobes, and by its larger apothecia and spores; these last organs being more cylindrical than those of *S. nigrescens.*

4. SYNECHOBLASTUS CONGLOMERATUS, (*Hoffm.*) Thallus submembranaceous, suborbicular, crenato-lobed, olive-black; lobules erect in the centre, fasciculate, dilated upwards and terminated by numerous apothecia; those of the circumference rounded, inciso-crenate, sterile. Apothecia minute, very numerous, often so much crowded as to almost obliterate the thallus, sessile; disc from concave becoming slightly convex, dark-red, surrounded by a thin, somewhat undulated margin; asci clavate, 8 spored; spores fusiform, normally quadrilocular, subhyaline; ·004 to ·005 in. long, by ·001 in. broad.

Collema conglomeratum, Hoffm. D. Fl. 2. 102.—Nyl. Syn. Lich. 115, L. P. 102!—*Lichen fascicularis,* Sm. E. Bot. 1162.—*Coll. fasciculare,* Hook. Brit. Fl. 2, 210.—*Coll. nigrescens, γ. conglomeratum et Coll. rupestre, γ. fasciculare,* Schær. Enum. 252 et 253, L. H. 415! et 419! —*Synechoblastus conglomeratus,* Kbr. S. L. G. 412.

On the trunks of old trees; rare. Scotland! *Mr. W. Gardiner.*

5. SYNECHOBLASTUS MULTIPARTITUS, (*Sm.*) Thallus coriaceo-membranaceous, radiating from a centre, deeply and repeatedly divided into somewhat linear undulated and twisted laciniæ, dull dark-olive, or nearly black above, olive-green beneath; laciniæ convex, the apices obtuse, crenate. Apothecia of a medium size, sessile; disc at first concave, reddish-brown, afterwards plane, dark-red, or nearly black, surrounded by a thickish, even, thallodal margin; asci cylindrico-clavate, 8 spored; spores unequally linear-oblong, straight, or curved quadrilocular, often becoming 6-7-8 locular, subhyaline; ·006 to ·009 in. long, by ·001 to ·00125 in. broad.

Collema multipartitum, Sm. E. Bot. 2582.—Hook. Brit. Fl. 2. 210.—Nyl. Syn. Lich. 116.—Schær. Enum. 258, et *Coll. turgidum,* Enum. 258 in pt., L. H. 433! in pt.—*Synechoblastus turgidus,* Kbr. S. L. G. 415.

On calcareous rocks and old walls. Dunkerron! *Dr. Taylor.* Kenmare! *I. Carroll, Esq.* Walls at Kendal! Westmoreland, *S. Hailstone, Esq.* Devonshire! *Admiral Jones.* Oswestry! *Rev. T. Salwey.*

6. SYNECHOBLASTUS COMPLICATUS, *(Schl.)* Thallus coriaceo-cartilaginous, somewhat radiating from the centre, inciso-lobed, smooth, or slightly granular, dull olive-black; lobes dilated, rounded, ascendant, very much crowded, imbricated and undulated in the centre, more or less depressed at the circumference; margins erect, or nearly so, entire, or very slightly crenate. Apothecia of a medium size, for the most part marginal, horizontal, subelevato-sessile; disc plane, dark-red, becoming reddish-black, surrounded by a thickish, even, or slightly crenated margin; asci short clavate, or clavato-ventricose, 8 spored; spores linear-oblong, constantly quadrilocular, straight, hyaline, or subhyaline; ·005 in. long, by ·00125 in. broad. PLATE 1. *Fig.* 6.

Collema melænum, var. complicatum, Schl. (fide Schær.)—*Coll. multifidum, α. complicatum,* Schær. Enum. 255, L. H. 418!—*Synechoblastus Laureri,* Fw. Kbr. S. L. G. 414?

On lime-stone rocks and old walls. Ingleborough! *I. G. Baker, Esq.* Abundant on old walls by the road side above the High Force Inn, Teesdale! Durham. Distinguished by the dilated, rounded, and very much crowded and undulated lobes of the thallus, the small more or less marginal apothecia, the short clavate asci, and by the straight linear-oblong, constantly quadrilocular spores. *S. Laureri* of Flotow and Koeber appears, from the description, to be identical with the specimen in Schærer's L. H. 418! (in my copy), and those from the above localities.

TRIBE 3. LEPTOGIACEÆ.

Thallus coriaceo-membranaceous, foliaceous, or caulescent, variously lobed and laciniated; rigid when dry, gelatinous and somewhat turgid when wet; epithallus distinctly cellular; gonidiac granules simple, or moniliform-coherent. Apothecia scutelliform, or patellæform.

GENUS 1. MALLOTIUM, (*Fw.*)

Apothecia scutelliform, margined by a thallodal exciple; thalamium thin, arising from a double hypothecium, the superior one thin, gelatinous, the inferior formed from the excipulum; asci subventricose, 8 spored; spores subelliptical, quadrilocular, becoming irregularly muriform-multilocular, uncoloured. Thallus coriaceo-membranaceous, foliaceous, variously lobed. Epithallus on the upper side of the thallus cellular, on the under side of it glaucous, tomentose; gonidiac granules moniliform-coherent; medullary stratum filamentose.

1. MALLOTIUM SATURNINUM, (*Dicks.*) Thallus coriaceous, consisting either of a single inciso-lobed leaf, or of many congregated together, sinuato-lobed and somewhat imbricated, the margins subascendant, rounded, entire; upper side greenish or brownish-black, smooth, or minutely furfuraceous; under side greyish-white, tomentose. Apothecia of a medium size, scattered, sessile; disc plane, reddish-brown, surrounded by a thin, entire margin; asci subventricose, 8 spored; spores

subelliptical, or oblongo-ventricose, quadrilocular, becoming irregularly muriform-multilocular, subhyaline; ·004 to ·006 in. long, by ·00225 to ·00275 in. broad. Plate 1, *fig.* 7.

Lichen saturninus, Dicks. Crypt. Fasc. 2. 21. t. 6. f. 8.—Sm. E. Bot. 1980.—*Coll. saturninum*, Ach. L. Univ. 644.—Hook. Brit. Fl. 2. 211.—*Coll. myochroum*, β. et γ. Schær. Enum. 256, L. H. 424! et 500!.—*Mallotium tomentosum*, Kbr. S. L. G. 416.—*Leptogium saturninum*, Nyl. Syn· Lich. 127.

On the trunks of trees in alpine districts. Teesdale! Durham, *Rev. J. Harriman.*

2. Mallotium Burgessii, (*Lightf.*) Thallus thin, coriaceo-membranaceous, subfoliaceous, laciniato-lobed; lobes crowded and somewhat imbricated, ascending, the margins variously lacerated, curled and crisped; upper side dull greenish-brown when wet, purplish-brown near the apices of the lobes, and pale brown at and near their base when dry; under side grey, minutely tomentose. Apothecia large, slightly elevated; disc from concave becoming nearly plane, smooth, reddish-brown, surrounded by a subfoliaceous, laciniated, sinuated and crisped thallodal margin; asci subventricose, 8 spored; spores subelliptical, or oblongo-ventricose, the extremities rounded, or attenuated, often diaphanous, from quadrilocular becoming either coarsely granular, or irregularly muriform-multilocular, subhyaline; ·007 to ·011 in. long, by ·0035 to ·0045 in. broad.

Lichen Burgessii, Lightf. Fl. Scot. 827. tab. 26.—Sm. E. Bot. 300.—*Collema Burgessii*, Ach. Syn. 320.—Hook. Brit. Fl. 2. 211.—Schœr. Enum. 256.—*Leptogium Burgessii*, Nyl. Syn. Lich. 132.

On the trunks of trees in subalpine districts. Cardiganshire! *Sir J. E. Smith*, Scotch Highlands! *Sir W. J. Hooker*, Killarney! Ireland, *J. Carroll, Esq.*

Genus 2. Leptogium, (*Fries.*)

Apothecia at first closed, from urceolate becoming plane, or nearly so, scutelliform or patellæform; thalamium arising from a gelatinous and cellular hypothecium; asci elongato-clavate, or cylindrico-clavate, 8 spored; spores elliptical oblong, ovate, or oblongo-ventricose, from quadrilocular becoming irregularly muriform-multilocular, uncoloured. Thallus foliaceo-membranaceous variously lobed. Epithallus distinctly cellular on both sides; gonidiac granules moniliform-coherent; medullary elements filamentose, hyaline.

The species comprising both the present and preceding genus are found in the same situations as *Collemæ* and *Synechoblasti;* they are also liable to a considerable amount of variation in their external aspect, expanding like them to a greater or less extent, on the application of water, and contracting to nearly the same degree on its withdrawal. They are however separated and distinguished from them, by their epithallus, which consists of an expansion of angular or rounded cellules; it is altogether different from the epithallus of the species composing the genera just named, and with due attention to this part, no difficulty need be entertained in discriminating them.

1. Leptogium cretaceum, (*Sm.*) Thallus very minute, simple,

stellato-lobed, dark-olive, lobes unequal, crenate. "Apothecia central, solitary, sessile; disc concave, reddish-brown, surrounded by a pale brown entire margin; asci 8 spored (?); spores subelliptical, from quadrilocular becoming irregularly muriform-multilocular, subhyaline."

Lichen cretaceus, Sm. E. Bot. 738.—*Collema cretaceum,* Ach. L. Univ. 642.—Hook. Brit. Fl. 2. 210.—*Leptogium cretaceum,* Nyl. Syn. Lich. 120.

On chalk and flint nodules. Near Lewis! Sussex, *W. Unwin, Esq.* I have not seen the apothecia, the above description of them is taken from Nylander's Syn. Lich. 120.

2. Leptogium fragrans, (*Smith.*) Thallus thin, membranaceous, roundly lobed, dark olive-green or nearly black when wet, olive-brown when dry; lobes very minute, ascending; margins somewhat thickened, crenated. Apothecia irregularly scattered, minute, sessile; disc plane, or slightly concave, pale brown, surrounded by a thickish, entire margin; asci elongato-cylindrical, 8 spored; spores oblongo-ventricose, or ovato-subpyriform, 4-6 locular, often becoming irregularly muriform-multilocular, subhyaline; ·006 to ·007 in long, by ·002 to ·003 in. broad.

Lichen fragrans, Sm. E. Bot. 1912.—*Collema fragrans,* Hook. Brit. Fl. 2. 208.

On the trunks of Ash, Elm, and other trees. Near Ayton! Cleveland, Yorkshire. In habit and general appearance this little plant closely resembles *Collema microphyllum,* but is distinguished from it, by its distinctly cellular epithallus, and by its different spores. There is also a strong affinity between the present species and *Lepto. subtile,* and in all probability further and more extended observations, may prove that it is merely a corticose variety of it.

3. Leptogium tenuissimum, (*Dicks.*) Thallus membranaceous, very minute, laciniato-lobed, deep-olive, or brownish-green; laciniæ minute, crowded, linear, the margins densely inciso-stellately divided. Apothecia of a medium size, sessile, conspicuous; disc at first urceolate, afterwards nearly plane, reddish-brown, surrounded by a thick, elevated, entire paler margin; asci cylindrico-clavate, 8 spored; spores elliptical-oblong, or oblong, the extremities rounded, or attenuated, irregularly muriform-multilocular, subhyline; ·005 to ·008 in long, by ·002 to ·0035 in. broad

Lichen tenuissimus, Dicks. Crypt. Fasc. 1. 12. t. 2. f. 8.—Sm. E. Bot. 1427.—*Collema tenuissimum,* Hook. Brit. Fl. 2. 213.—*Coll. atro-cæruleum,* δ. *tenuissimum,* Schær, Enum. 249, L. H. 408 !.—Hepp. Eur. 211 !.—*Lepto. tenuissimum et Lepto. subtile,* Kbr. S. L. G. 419 et 420 in pt.—*Lepto. spongiosum,* Nyl. Syn. Lich. 119, (excl. syn. *Lich. spongiosus,* Sm. E. Bot. 1374).

On dry banks, among mosses or short grass. Near Yarmouth! *D. Turner, Esq.* Near Cork! *I. Carroll, Esq.* Armagh! *Admiral Jones.* Sidmouth! *Rev. T. Salwey.* Near Ayton! Cleveland, Yorkshire. What I have always been accustomed to regard as the true *Lichen spongiosus,* of Sm. E. Bot. 1374, is identical with *Lecanora limbata,* Sommf. (Solorina limbata of this work.) I therefore still retain *Lichen termissimus,* Dicks. and Sm. E. Bot. 1427, as distinct from it.

4. Leptogium subtile, (*Schrad.*) Thallus membranaceous, very

minute, laciniato-lobed, dull olive-green; laciniæ substellated and cut into numerous very narrow linear imbricated and appressed segments. Apothecia very minute, more or less numerous and crowded, sessile; disc from urceolate, becoming nearly plane, pale watery-brown when moist and growing, darker when dry, surrounded by a thin entire margin of nearly the same colour; asci elongato-clavate, 8 spored; spores subelliptical, or elliptical-oblong, the apices obtuse, or elongato-attenuated, irregularly muriform-multilocular, subhyaline; ·005 to ·007 in. long, by ·002 to ·003 in. broad. PLATE 1. *fig.* 8.

Lichen subtilis, Schrad. Spic. 95. (fide Schær.)—Smith E. Bot. 1008.—*Collema subtile*, Hook. Brit. Fl. 2. 213.—Schær. Enum. 250.—Hepp. Eur. 413!.—*Leptogium subtile*, Nyl. Syn. Lich. 121.

On the ground, in damp shady situations. Yarmouth! *D. Turner, Esq.* Shanklin, Isle of Wight! *Rev. T. Salwey.* Clay banks, near Ayton! Cleveland, Yorkshire.

5. LEPTOGIUM LACERUM, (*Swartz.*) Thallus very thin and subdiaphanous, membranaceo-foliaceous, lacero-lacinated, somewhat longitudinally reticulato-lacunose, bluish-brown when dry, olive-brown when wet; laciniæ subimbricated, dilated, subascendant, the margins denticulato-ciliated and crisped. Apothecia minute, rarely present, scattered, elevato-sessile; disc concave, reddish-brown, surrounded by a thick, smooth margin; asci cylindrico-clavate, 8 spored; spores somewhat ovate, or oblongo-ventricose, the extremities more or less attenuated, irregularly muriform-multilocular, subhyaline; ·007 to ·009 in. long, by ·00225 to ·003 in. broad.

Lichen lacerus, Swartz, Ach. Prod. 133.—Smith E. Bot. 1982.—*Collema lacerum*, Ach. Syn. 327.—Hook. Brit. Fl. 2. 213.—*Coll. atrocœruleum*, Schær. Enum. 248, L. H. 404!.—*Leptogium lacerum*, Kbr. S. L. G. 417.—Nyl. Syn. Lich. 122.

β. PULVINATUM, (*Hoffm.*) Thallus smaller, pulvinate, lacero-laciniated, dark brown; laciniæ very much crowded, the margins remarkably curled, crisped and somewhat granulose. Apothecia as above.

Collema pulvinatum, Hoffm. D. Fl. 2. 104. *Coll. atro-cœruleum, β. pulvinatum*, Schær. Enum. 249, L. H. 406!—*Leptogium lacerum, β. pulvinatum*, Kbr. S. L. G. 418.—Nyl. Syn. Lich. 122.

On rocks and old walls, among mosses in shady situations in subalpine districts. Whitstoncliffe, and other places near Thirsk, Yorkshire, *J. G. Baker, Esq.* Ingleborough! *Dr. Carrington.* Armagh! *Admiral Jones.* Killarney! Ireland, *I. Carroll, Esq.* On the old walls of Mulgrave Castle! near Whitby; and in Baysdale! and Kildale! all in Cleveland, Yorkshire.

6. LEPTOGIUM SINUATUM, (*Huds.*) Thallus thin, membranaceo-foliaceous, sinuato-lobed, reticulato-rugulose, olive-green when wet, brownish-lead colour when dry; lobes rounded, crowded and imbricated, the margins entire, or nearly so, suberect. Apothecia minute, very numerous, sessile; disc brown, from concave becoming nearly plane, surrounded by a smooth, entire, elevated margin; asci cylindrico-clavate, 8 spored; spores oblongo-ventricose, the extremities rounded or attenuated, internally coarsely granular, or irregularly muriform-multilocular, subhyaline; ·007 to ·010 in. long, by ·0025 to ·0045 in. broad.

Lichen sinuatus, Huds. Fl. Angl. 2. 535.—E. Bot. 772.—*Coll. sinua-*

tum, Hook. Brit. Fl. 2. 213.—Schær. Enum. 250, L. H. 405!.—*Coll. scotinum*, Ach. L. Univ. 651.—*Leptogium sinuatum*, Kbr. S. L. G. 418. —*Lepto. scotinum*, Nyl. Syn. Lich. 123. L. P. 101!

On old mossy walls, in subalpine districts. Armagh! *Admiral Jones.* Near Cork! *I. Carroll, Esq.* Very abundant on old walls in the neighbourhood of Stanhope! Durham. Readily distinguished from the preceding species, by the suberect rounded lobes of the thallus, by their margins being nearly or quite entire, and by its more abundant apothecia.

7. Leptogium tremelloides, (*L.*) Thallus thin, subdiaphanous, membranaceo-foliaceous, lobed smooth, dull olive-green when wet, pale lead-coloured when dry; lobes oblong, rounded and imbricated, ascending, the margins entire, or slightly denticulated. Apothecia of a medium size, scattered, elevato-sessile; disc at first urceolate, afterwards nearly plane, reddish-chestnut, surrounded by a thick, entire, elevated, pale lead-coloured margin; asci cylindrico-clavate, 8 spored; spores subelliptical, or ovato-oblong, the extremities attenuated, or rounded and somewhat obtuse, from quadrilocular becoming irregularly muriform-multilocular, subhyaline; ·006 to ·007 in. long, by ·00275 to ·00325 in. broad.

Lichen tremelloides, L.—Sm. E. Bot. 1981.—*Coll. tremelloides*, Ach. Syn. 325.—Hook. Brit. Fl. 2, 213.—Schær. Enum. 251 et *Coll. cyanescens*, 250, L. H. 409!—*Lepto. cyanescens*, Kbr. S. L. G. 420.—*Lepto. tremelloides*, Nyl. Syn. Lich. 124.

On rocks, among mosses in subalpine districts, also near the sea. Scotland! authentic specimen from *Dickson* in *Harriman's* herbarium. Killarney! and on rocks by the sea, Blackwater Bridge! Kerry, *I. Carroll, Esq.*, Barmouth! North Wales, *Rev. T. Salwey*. This species may be recognised at first sight, by its pale lead-coloured thallus, and elevated apothecia.

8. Leptogium palmatum, (*Huds.*) Thallus cæspitose, membranaceo-foliaceous, laciniato-lobed, greenish or greyish-brown, lobes nearly erect, crowded, somewhat linear, much divided furcated and dentated, the margins convolute. Apothecia small, sessile, irregularly scattered over the disc of the lobes; disc concave, reddish-brown, surrounded by an elevated, entire margin of nearly the same colour; asci elongato-clavate, 8 spored; spores elliptical, attenuated towards the extremities, irregularly celluloso-multilocular, pale yellow, or hyaline; ·007 to ·008 in. long, by ·003 to ·0035 in. broad.

Lichen palmatus, Huds.—Sm. E. Bot. 1635.—*Coll. palmatum*, Ach. Syn. 319.—Hook. Brit. Fl. 2. 210.—*Leptogium palmatum*, Nyl. Syn. Lich. 126.

On sandy ground, among mosses and short grass. Armagh! *Admiral Jones*. Sand hills on the sea coast, at Coatham! Cleveland. The above description has been chiefly drawn up from an authentic specimen from France! kindly furnished by *Dr. Nylander*.

9. Leptogium chloromelum, (*Sw.*) Thallus membranaceo-foliaceous, broadly lobed, rugoso-plicate, and somewhat fuligineo-furfuraceous, brownish or greenish lead-colour; lobes large, undulated, the margins entire, or crenulated. "Apothecia (of very rare occurrence) rather large, superficial; disc red, or reddish-brown, plane or slightly concave,

surrounded by a granulato-furfuraceous, or rogoso-plicate, thallodal margin; spores somewhat elliptical, attenuated towards the extremities, 4-6 locular, and at times once longitudinally divided, subhyaline."

Lichen chloromelus, Sw. Fl. Ind. occid. p. 1862. (fide Nyl.)—*Coll. chloromelum*, Ach. Syn. 321.—*Coll. ruginosum*, Schær. Enum. 251.—*Synechoblastus ruginosus*, Hepp. Eur. 421 !—*Leptogium Brebissonii*, Mnt. Canar. p. 130.—*Lepto. chloromelum*, Nyl. Syn. Lich. 128.

On stones, and on the mossy trunks of old trees. Barmouth! North Wales, *Rev. T. Salwey*. I have not seen the present species in a state of fructification. The spores are represented by *Hepp*, as being of an elongato-acicular figure, from 6 to 14 locular, in fact similar to those of *Synechoblastus nigrescens;* whereas they are described by *Nylander* as being "ellipsoideæ vel utroque apice attenuatæ, 3-5 septate, (et simul interdum longitudinaliter divisæ, loculis 6-12), longit. 0,020-37 millim., crassit. 0,010-17 millim." The specimen from Barmouth, furnished by the Rev. T. Salwey, agrees in every respect with those in Hepp's Eur. 421, with the exception of the figures of the spores. The thin, broadly lobed, rugoso-plicate thallus, and distinctly cellular epithallus, renders this species, either in a fertile, or sterile state, easily recognisable.

10. LEPTOGIUM SCHRADERI, (*Bernh.*) Thallus coriaceo-gelatinous, cæspitose, erect, dichotomously branched, dull olive-green; branches sublinear, sulcato-rugose and somewhat angular, slightly constricted near the axils, dilated in the middle, apices obtuse. "Apothecia very rarely produced, lateral; disc reddish, surrounded by a pale margin; spores. . . . . ?"

Lichen Schraderi, Bernh. in Schrad. Journ. for 1799. 1. p. 22. t. 2. f. 5.—*Coll. Schraderi*, Ach. L. Univ. 658.—Sm. E. Bot. 2284.—Hook. Brit. Fl. 2. 213.—*Leptogium Schraderi*, Nyl. Syn. Lich. 133.

On the ground among mosses, &c., on a clayey soil. Killarney! Ireland, *D. Moore, Esq.* Epithallus distinctly cellular; cells angular. Readily known by its cæspitose and somewhat fruticulose habit.

GENUS 3. POLYCHIDIUM, (*Ach.*)

Apothecia subterminal, horizontal, at first closed, becoming concave, and finally scutelliform, margined by a thallodal exciple; thalamium arising from a double hypothecium, superior one thin, gelatinous, inferior cellulose; asci clavato-ventricose, 8 spored; spores oblongo-fusiform, bilocular subhyaline. Thallus filamentoso-fruticulose, pulvinate, subdichotomously branched. Epithallus cellular; cells very distinct rotundato-angular; gonidiac granules pale green, mostly simple; medullary stratum composed of somewhat elongated hyaline cells, longitudinally disposed.

The present genus is composed of one species, which has been disunited from *Leptogium*, on account of its filamentose and somewhat dichotomously-branched thallus, fruticulose habit, horizontal apothecia, and bilocular spores.

1. POLYCHIDIUM MUSCICOLUM, (*Sw.*) Thallus filamentoso-fruticulose, pulvinate, subdichotomously branched, olive-black, or dark-brown; branches minute cylindrical, suberect, or decumbent, entangled and interbranching, rigid when dry, soft and gelatinous when wet. Apothecia

of a medium size, subterminal, horizontal; disc at first concave, afterwards nearly plane, dark reddish-brown, surrounded by a thin, smooth, entire margin; asci ventricoso-clavate, 8 spored; spores oblongo-fusiform, bilocular, subhyaline; ·005 to ·006 in. long, by ·00125 to ·0025 in. broad. PLATE 1, *fig*. 9.

Lichen muscicola, Sw. in Nat. Act. Ups. 4. p. 248. (fide Schær.)—Sm. E. Bot. 2264.—*Coll. muscicola,* Ach. Syn. 328.—Hook. Brit. Fl. 2. 214.—Schær. Enum. 248. L. H. 403!—*Polychi. muscicolum,* Kbr. S. L. G. 421.—*Lepto. muscicola,* Nyl. Syn. Lich. 134. t. 4. fig. 11—15.

On rocks among mosses in alpine districts. Egleston! Durham, *Rev. J. Harriman.* Oswestry! *Rev. T. Salwey.*

FAM. 2. MYRIANGIACEÆ, *(Nyl.)*

Thallus equally cellulose, unstratified, coriaceous, noduloso-pulvinate, olive-black. Apothecia subscutelliform, innate, of an equal cellulose texture and of nearly the same colour as the thallus; thalamium destitute of amylaceous matter, paraphyses, and hypothecium; asci spherical, or elliptical, irregularly imbedded in the cellulose thalamium, each containing 8 spores; spores elliptical-oblong, or oblong, quadrilocular, or irregularly submuriform-multilocular, subhyaline, or pale yellow.

The present family consists of two or three very minute species, which exhibits, as will readily be perceived, many remarkable, peculiar, and distinctive features, both in the structure of their thallus and apothecia, and in the form of their asci in which the spores are contained. In general habit, nature, and structure of their thallus, the species somewhat resemble and incline towards the *Collemaceæ,* but cannot be united to them, as the structure of their apothecia is totally different; neither can they be included in *Lichenaceæ,* on account of the unstratified nature of their thallus, their cellular apothecia, their thalamium destitute of paraphyses, hypothecium, and amylaceous matter: their apothecia are also similar in texture to the thallus, and of nearly the same colour. One species only is found in Great Britain.

TRIBE 1. MYRIANGIEÆ.

GENUS 1. MYRIANGIUM, *(Mont. et Berk.)*

Apothecia subscutelliform, innate in the apices of the thallus; thalamium cellulose, of nearly the same colour as the thallus, and with the asci irregularly imbedded in it; asci spherical, or elliptical, 8 spored; spores oblong, or elliptical-oblong, quadilocular, or irregularly submuriform-multilocular, pale yellow, or subhyaline. Thallus uniformly cellulose, coriaceous, noduloso-pulvinate; hypothallus none.

1. MYRIANGIUM DURIÆI, *(Mont. et Berk.)* Thallus tuberculato-glomerate, or noduloso-confluent, olive-black, forming minute depressed pulvinate scattered nodules. Apothecia innate in the apices of the

nodules, minute, slightly depressed or plane, nearly the same colour as the thallus; spores oblong, or elliptical-oblong, quadrilocular, or irregularly submuriform-multilocular, pale yellow, or internally subgranular; ·004 to ·006 in. long, by ·002 to ·0025 in. broad. PLATE 1. *fig.* 10.

Myriangium Duriæi, Mnt. et Berk. in Hook. Journ. Bot. 1845, p. 73. —Npl. Syn. Lich. 139. t. 4. fig. 1-5!—*Collema glomerulosum,* Tayl. Fl. Hib. pt. 2. 108. (excl. Syn.)

On the smooth bark of young ash trees. Near Cork! Ireland, *I. Carroll, Esq.* and *Mr. J. Wright.* Sark! and Isle of Wight! *Rev. T. Salwey.* Penzance! *Dr. Ralfs.*

FAM. 3. LICHENACEÆ, (*Nyl.*)

Thallus extremely variable both in form, colour, and texture, being sometimes fruticulose, at others foliaceous, squamulose, squamuloso-radiated, granuloso-crustaceous, pulverulent, and sometimes none, or athalline; in substance, varying from coriaceous to membranaceous, and from tartareous to a mere film; and in colour white, grey, yellow, orange, brown, red, and sometimes black, or blackish, with all their intermediate shades. Internal anatomic elements normally stratified; gonidiac granules simple, rarely, or perhaps never truly moniliform-coherent. Apothecia either disciform, thalamiferous; or verrucæform, nucleiferous; stipitate, sessile, or innate; very variable in colour, but rarely concolorous with the thallus.

DIV. 1. GYMNOCARPI, (*Fries.*)

Apothecia normally open, disciform, lirellæform, crateriform, or maculæform; thalamium contained in a thallodal exciple, a proper exciple, or altogether destitute of one.

Tribe 1. Cladoniaceæ, (*Zenk.*)

Thallus in the superior genera, fruticuloso-caulescent, erect, or ascendant, arising from a more or less evident horizontal squamuloso-granulose, or crustaceous proper thallus; in the inferior ones, simply crustaceous, uniform. Apothecia terminal, or lateral, stipitate, or sessile, orbicular, becoming cephaloid; internally lacunose, or solid; variously margined, or immarginate.

Subtribe 1. Cladonieæ.

Thallus fruticuloso-ascendant, consisting of a horizontal squamuloso-foliaceous, squamuloso-granulose, or crustaceous proper thallus, from which arises a vertical caulescent cartilaginous fistulose thallus (*podetia* *of Auct.)* Apothecia terminal, or lateral, orbicular, cephaloid, internally lacunose.

GENUS 1. CLADONIA, (*Hoffm.*)

Apothecia terminal, orbicular, submargined by a proper exciple, becoming at length inflated, cephaloid, and immarginate; internally lacunose, or hollow; thalamium arising from a carnose, simple hypothecium; asci clavæform, each containing 8 spores; spores minute, elliptical, or oblong, unilocular, hyaline, or uncoloured; ·002 to ·003 in. long, by ·0005 to ·00075 in. broad. Podetia cartilaginous, vertical, fistulose, fruticulose, or subfruticulose, the extremities either simple, stipiform, dilatato-tubæform, or scyphiform, naked, or foliaceo-squamulose. Thallus horizontal, squamuloso-foliaceous, or crustaceous.

After a careful examination of several hundred specimens, from various localities, of the species constituting the present genus, I am fully convinced that several of those hitherto considered as distinct species, are in reality not so, and I am of opinion that they ought to be regarded merely as varieties, as the different aspect which many of them assumes arises, more from stage of growth and local circumstances, than from any real specific difference. The spores bearing a general resemblance to each other in all the species, they have not been described specifically.

SECT. 1. PHÆOCARPÆ.—*Apothecia reddish-brown, brown, or pale flesh coloured.*

SUBSECT. A. *Thallus squamuloso-foliaceous. Apothecia reddish-brown.*

1. CLADONIA ENDIVIÆFOLIA, (*Fries.*) Thallus foliaceous, elongato-laciniated, prostrate, pale green above, creamy-white beneath; laciniæ somewhat pinnatifid, flattish, their apices rounded, subascendant; podetia arising from the upper surface of the thallus, cartilaginous, smooth, short, simple; scyphi irregular elongato-turbinate. Apothecia terminal, or marginal on the scyphi, reddish-brown, at length convex, immarginate.

Cladonia endiviæfolia, Fries L. Ref. 212.—Nyl. L. P. 106! Enum. Gen. 94.—*Lichen endivifolius,* Dicks.—Sm. E. Bot. 2361.—*Scyphophorus endivifolius,* Hook. Brit. Fl. 2. 238.—*Cenomyce endivifolia,* Ach. Syn. 250.—*Cladonia endivifolia,* Schær. Enum. 194, L. H. 456!

β. ALCICORNIS, (*Lightf.*) Thallus cæspitose, subfoliaceous, palmato-laciniated, pale green above, creamy-white beneath; laciniæ crenato-dentate, ascendant, their apices obtuse, crenate; podetia elongato-turbinate, smooth, of the same colour as the thallus; scyphi regular, concave, or plane, crenulate, proliferous. Apothecia reddish-brown, immarginate.

Lichen alcicornis, Lightf.—Sm. E. Bot. 1392.—*Cladonia alcicornis,* Fries. Lich. Ref. 213.—Leight. Exs. 15!—Schær. Enum. 194, L. H. 455!—Kbr. S. L. G. 17.—Nyl. Enum. Gen. 94.—*Cenomyce alcicornis,* Ach. Syn. 250.—*Scyphophorus alcicornis,* Hook. Brit. Fl. 2. 238.

On dry, sandy, or turfy heaths; also on rocks in shady situations, in alpine and subalpine districts, but not very common. *α.* Sandhills, near Yarmouth! *D. Turner, Esq.* *β.* Haughmond Hill! Shropshire, *Rev. W. A. Leighton.* Malvern! *Rev. J. H. Thompson.* Larchbank! near Great Ayton, Cleveland, Yorkshire. This only differs from the preceding by being about half its size, and rather more cæspitose.

SUBSECT. B.—*Thallus squamulose ; podetia normally scyphiferous ; scyphi closed with a diaphragm. Apothecia brown.*

2. CLADONIA PYXIDATA, (*L.*) Thallus squamulose; squamules thickish, crenato-lobed, green above, white beneath; podetia short, glaucous-green, at length granuloso-verrucose, or furfuraceous, turbinate; scyphi cyathiform, dilated, often proliferous. Apothecia brown, convex, immarginate.

Lichen pyxidatus, L.—Sm. E. Bot. 1393.—*Cladonia pyxidata*, Fries L. Ref. 216.—Schær. Enum. 191.—Kbr. S. L. G. 17.—Nyl. Enum. Gen. 94.—*Scyphophorus pyxidatus*, Hook. Brit. Fl. 2. 238.

A. POCILLUM, (*Ach.*) Thallus crenulato-lobed; podetia short, greyish-green, granuloso-verrucose ; scyphi cyathiform, simple.

Cenomyce Pocillum, Ach.—*Cladonia pyxidata, var. pocillum*, Nyl. L. P. 19 !—*C. pyxidata*, α. Schær. Enum. 191, L. H. 52 !

B. SIMPLEX, (*Schær.*) Thallus squamulose, appressed, olive-brown ; podetia rather small, nearly naked ; scyphi simple.

Cladonia pyxidata, c. *Simplex*, Schær. Enum. 191, L. H. 53 !

C. MARGINALIS, (*Schær.*) Podetia subsquamuloso-granulose ; scyphi proliferous from the margins.

C. pyxidata, var. marginalis, Schær. Enum. 191, L. H. 55 !

D. TUBERCULOSA, (*Schær.*) Podetia granulose ; scyphi proliferous, fertile. Apothecia subpedicellate, often symphicarpous.

C. pyxidata, var. tuberculosa, Schær. Enum. 191, L. H. 54 !

E. SUBULATA, (*Schær.*) Podetia elongato-cylindrical, subulate, simple, subsquamulose at the base, otherwise naked ; scyphi none.

C. pyxidata, var. subulata, Schær. Enum. 191, L. H. 51 !

F. EPIPHYLLA, (*Schær.*) Thallus squamulose, crenato-lobed, pale green above, white beneath ; podetia none.

C. pyxidata, var. epiphylla, Schær. Enum. 191, L. H. 269 !

β. FIMBRIATA, (*L.*) Thallus squamulose, inciso-crenate, greyish-green above, white beneath ; podetia more or less elongated, glaucous white, or pale green, pulverulent, cylindrical, cylindrico-subulate, or tubæform ; scyphiferous ; scyphi regular, or proliferous, cupulæform, margin erect, more or less dentato-fimbriated Apothecia brown, convex and immarginate.

Lichen fimbriatus, L.—Sm. E. Bot. 2438.—*Cenomyce fimbriata*, Ach. Syn. 254.—*Cladonia fimbriata*, Fries L. Ref. 222.—Schær. Enum. 190. —Kbr. S. L. G. 22.—Nyl. Enum. Gen. 94.—*Scyphophorus fimbriatus*, Hook. Brit. Fl. 2. 239.

A. CORNUTA, (*Flk.*) Podetia subsimple, elongato-subulate, their apices more or less attenuated, acute.

C. fimbriata, var. cornuta, Schær. Enum. 191, L. H. 56 !

B. DENDROIDES, (*Flk.*) Podetia branched ; branches subulate.

Kbr. S. L. G. 22.

C. RADIATA, (*Schær.*) Podetia elongato-cylindrical ; scyphi narrow, proliferous, elongato-radiated, subulate.

C. fimbriata, var. radiata, Schær. Enum. 191, L. H. 61 !

D. PROLIFERA, (*Schær.*) Podetia elongato-cylindrical, simple or branched ; scyphi narrow, proliferous, radiato-fimbriated, fertile. Apothecia brown, convex, immarginate.

C. fimbriata, var. prolifera, Schær. Enum. 190, L. H. 60 !—*C. fimbriata, var. Leight.* Exs. 325 !—*C. fimbriata, var. isidiosa*, Nyl. L. P. 21 !

E. TUBÆFORMIS, (*Flk.*) Podetia elongated, scyphiferous; scyphi cyathiform, dentato-fimbriated, or nearly entire.

C. fimbriata, b. tubæformis, Fries L. Ref. 222.—Schær. Enum. 190, L. H. 58!

F. MACRA, (*Flk.*) Podetia very slender; scyphi slightly dilated, their margins entire, or minutely denticulated.

G. DENTICULATA, (*Flk.*) Podetia short; scyphi large, dentato-fimbriated, often proliferous.

C. fimbriata, var. denticulata, Schær. Enum. 190, L. H. 589!

H. CARPOPHORA, (*Flk.*) Scyphi large, fertile. Apothecia symphicarpous, somewhat pedicellate, brown, immarginate.

C. fimbriata, var. tuberculosa, Schær. Enum. 190, L. H. 59!

γ NEGLECTA, (*Flk.*) Thallus squamulose, roundly lobed; podetia cartilaginous, at first nearly smooth, afterwards granuloso-verrucose, glaucous-green; scyphi turbinate, proliferous. Apothecia brown.

Cladonia neglecta, Flk. Schær. Enum. 192, L. H. 270! et 510!

On the ground on turfy heaths, sandy banks, old walls, and on rocks among mosses, &c.; all more or less common. The varieties of *pyxidata,* only differ from those of *fimbriata,* by their podetia being granuloso-verrucose, or furfuraceous. The different appearance of the scyphi is frequently, in some measure, due to the presence or absence of the spermogones, which generally speaking are of common occurrence, and which are seated on the margins of the scyphi, or on the apices of their dentations, still every minute brown tubercle on their margins must not be regarded as spermogones, as the greatest part of them are in reality diminutive apothecia. The spermogones are at first of a pale flesh colour, afterwards brown, minute, tuberculiform, ovato-oblong, or subrotund, prominent; ostiole usually distinct, and often appearing as if slightly depressed around the superior margin; sterigmata simple, palmately divided; spermatia cylindrico-arcuate, of an equal width throughout, or at times slightly attenuated towards the extremities; ·0015 to ·00175 in. long, by ·00012 in. broad.

3. CLADONIA GRACILIS, (*L.*) Thallus squamuloso-foliaceous, olive-green above, white beneath; podetia elongated, smooth, brownish-green, or olive-brown, simple or branched, cylindrico-subulate or scyphiferous; scyphi narrow, the margins entire, dentato-fimbriated, or proliferous. Apothecia brown, solitary, or symphicarpous, convex, immarginate.

Lichen gracilis, L. Spic. 1619.

α. CERVICORNIS, (*Ach.*) Thallus cartilaginous, laciniato-lobed, dark olive-green above, white beneath; lobes nearly erect, somewhat pinnatifid; podetia short, of the same colour as the thallus; scyphi nearly plane, at length proliferous. Apothecia marginal, sessile, brown.

Lichen cervicornis, Ach. Prod. 184.—Sm. E. Bot. 2574.—*Cladonia gracilis,* a. et b. Fries L. Ref. 219 in pt.—*C. cervicornis,* Schær. Enum. 195, L. H. 62! et 457!—Leight. Exs. 14!—Kbr. S. L. G. 19.—*Scyphophorus cervicornis,* Hook. Brit. Fl. 2. 238.

β. VERTICILLATA, (*Hoffm.*) Thallus cartilaginous, squamulose, inciso-crenate, dark-olive, or greyish-green; podetia scyphiferous; scyphi dilated, plane, repeatedly proliferous from the centre. Apothecia small, sessile on the margins of the scyphi, dark-brown, often symphicarpous.

Cladonia verticillata, Hoffm.—*C. gracilis,* α. Fries L. Ref. 219, in pt.—*C. cervicornis, var. centralis,* Schær. Enum. 195, L. H. 63!, et *C.*

degenerans, var. centralis, Schær. Enum. 193, L. H. 458!—*C. cervicornis, β.* Kbr. S. L. G. 19.

γ. HYBRIDA, (*Fries.*) Thallus squamulose, often evanescent; podetia elongato-cylindrical, mostly scyphiferous; scyphi dilated, the margins more or less dentato-fimbriated, or proliferous. Apothecia brown.

Cladonia gracilis, β. hybrida, Fries L. Ref. 219, in pt.—Kbr. S. L. G. 18.—*C. gracilis, β. turbinato,* Schær. Enum. 196, L. H. 65!

B. SIMPLEX, (*Schær.*) Podetia elongato-cylindrical, generally simple; scyphi dentato-radiated, fertile.

Cladonia gracilis, β. turbinata, var. simplex, Schær. Enum. 196, L. H. 66!

C. CHORDALIS, (*Schær*) Podetia elongato-subulate, simple, or proliferous, sterile.

Cladonia gracilis, α. chordalis, Schær. Enum. 195, L. H. 64!—Leight. Exs. 296!—*C. gracilis, c. elongata,* Fries L. Ref. 219.—*Lichen gracilis,* Sm. E. Bot. 1284.—*Scyphophorus gracilis,* Hook. Brit. Fl. 2. 239.

δ. DEGENERANS, (*Flk.*) Thallus squamulose, inciso-crenate, glaucous green above, white beneath; podetia cartilaginous, olive, or greenish-white, becoming brownish-black and variegated with white at the base, glabrous, granulato-furfuraceous, or squamuloso-rugose, simple, or irregularly and proliferously branched, scyphiferous; scyphi irregular, cristato-lacerated. Apothecia brown.

Cladonia degenerans, Flk. Clad. 41.—Fries L. Ref. 221.—Schær. Enum. 193.—Kbr. S. L. G. 20.

A. HAPLOTEA, (*Flk.*) Podetia elongated; scyphi crenato-radiated, or palmato-dilated. Apothecia minute, sessile, or pedicellate.

Kbr. S. L. G. 20.—*C. degenerans, var. simpliuscula,* Schær. Enum. 193, L. H. 274!

B. EUPHOREA, (*Flk.*) Scyphi radiato-proliferous. Apothecia of a medium size, pedicellate.

Kbr. S. L. G. 20.

C. ANOMÆA, (*Sm.*) Podetia squamuloso-rugose; scyphi radiated, Apothecia sessile, or pedicellate, dark-brown.

Lichen anomæus, Sm. E. Bot. 1867.—*Scyphophorus anomæus,* Hook. Brit. Fl. 2. 238.

D. PHYLLOPHORA, (*Ehrh.*) Podetia and scyphi lacero-proliferous, subsquamulose or naked; prolifications mostly marginal, substerile.

Lichen phyllophorus, Ehrh. *Cladonia degenerans, var.* Kbr. S. L. G. 20.—*C. degenerans,* var. Hepp. Eur. 295.

E. CARIOSA, (*Flk.*) Podetia rather short, cariose when old; scyphi digitately divided into fastigiate branches. Apothecia brown, symphicarpous.

Cladonia cariosa, Flk. Comm. 11.—Borr. in E. Bot. Suppl. 2761.

On the ground on turfy heaths, among mosses, etc.; common in alpine and subalpine districts. To allow the principal varieties of the above to rank as distinct species, appears to me to be wholly inadmissible, as they are all closely allied to each other, and connected by intermediate states. The spermogones are generally placed on the margins of the scyphi, or on the apices of the sterile podetia, (in the variety *cervicornis,* they sometimes occur on the lobes of thallus). They are dark-brown, minute, tuberculiform, ovato-oblong, or subelliptico-oblong; ostiole distinct, slightly depressed; sterigmata normally simple, palmatifid, at times elongated, sterile, and palmato-multifid, filling the whole cavity of the spermogone; spermatia acicular, curved, ·001 to ·0015 in. long, by ·0001 in. broad.

* *Apothecia pale flesh-coloured.*

4. CLADONIA CARNEOLA, *Fries.* Thallus squamulose, brownish-green above, white beneath; podetia rather short, becoming at length finely pulverulent, pale sulphur-coloured, changing to bluish-brown at their base, turbinato-scyphiferous; scyphi simple or proliferous. Apothecia large, pale flesh-coloured when young, darker when old.

Cladonia carneola, Fries L. Ref. 233.—Nyl. Enum. Gen. 95.—Kbr. S. L. G. 25.—*C. pallida,* Schær. Enum. 190.—Hepp. Eur. 1!

On the earth and dead wood, in alpine districts; but not common.

SUBSECT. C.—*Podetia not passing into closed scyphi, the axils and apices dilatato-infundibuliform, or simply perforated. Apothecia brown.*

5. CLADONIA SQUAMOSA, (*Hoffm.*) Thallus squamulose, lacero-dissected, often somewhat pulverulent, glaucous-grey or olive-green above, white beneath; podetia at first nearly glabrous, lacunose, at length rugoso-squamulose, ventricoso-infundibuliform or subulate, proliferously branched; apices and axils dilated. Apothecia minute, aggregated, cymose, brown.

Cladonia squamosa, Hoffm. Germ. 2. p. 125.

α. VENTRICOSA, *Fries.* Podetia ventricose, repeatedly branched; axils and apices dilatato-infundibuliform. Apothecia minute, cymose, brown.

Fries. L. Ref. 231.—Kbr. S. L. G. 33.—*Lichen sparassus,* Smith E. Bot. 2362.—*Scyphophorus sparassus,* Hook. Brit. Fl. 2. 237.—*Cladonia squamosa, β.* Schær. Enum. 199, L. H. 278!

B. ATTENUATA, *Fries.* Podetia slender, attenuated, the apices subulate, sterile.

Fries L. Ref. 231.

β. MICROPHYLLA, *Schær.* Podetia short, slender, rugose with minute squamules, or granuloso-furfuraceous, infundibuliform, simple or proliferously branched; branches slender; apices dilated, or subulate.

Schær. Enum. 198.

A. SIMPLIUSCULA, *Schær.* Podetia nearly or quite simple; apices dilated, fertile.

Schær. L. H. 72!

B. PROLIFERA, *Schær.* Podetia proliferously branched; prolifications fertile, or subulate and sterile.

Schær. L. H. 73! et 74!

γ. DECORTICATA, (*Flk.*) Thallus squamulose, pale green above, white beneath; podetia slender, cylindrico-subulate, the membranaceous epidermiis separating into furfuraceous squamules, becoming at length grey-pulverulent and eventually nearly naked; scyphi narrow, rarely produced. Apothecia brown, symphicarpous.

Cladonia decorticata, Flk. C. 10.—Fries L. Ref. 226.—Kbr. S. L. G. 25.—*C. squamosa, γ. decorticata,* Schær. Enum. 199, L. H. 279!

δ. DELICATA, (*Ehrh.*) Thallus squamulose, minutely eroso-laciniated, becoming granuloso-pulverulent; podetia minute, delicate granuloso-pulverulent, cylindrical, simple or proliferously branched; prolifications short, somewhat thickened. Apothecia minute, brown, often symphicarpous.

Lichen delicatus, Ehrh. Crypt. 247.—E. Bot. 2052.—*Scyphophorus parasiticus*, Hook. Brit. Fl. 2. 237.—*Cladonia squamosa, var. delicata*, Fries L. Ref. 231.—Kbr. S. L. G. 33.—Nyl. L. P. 24!—*C. squamosa*, δ. *parasitica*, Schær. Enum. 199, L. H. 75!—Hepp. Eur. 112!.

ε. CÆSPITITIA, (*Ach.*) Thallus squamulose, bright green above, white beneath; squamules more or less congregated together, in little tufts, ascendant, dilatato-pinnatifid, the margins lacinulato-crisped; podetia arising from the disc of the squamules, very short, naked, pale, cylindrical, simple or divided. Apothecia symphicarpous, reddish-brown.

Cenomyce cæspititia, Ach. Syn. 249.—*Lichen cæspititius*, E. Bot. 1796.—*Scyphophorus cæspititius*, Hook. Brit. Fl. 2. 236.—*Cladonia squamosa*, ε. *fungiformis*, Schær. Enum. 199, L. H. 280!

ζ. LEPTOPHYLLA, (*Ach.*) Thallus squamulose; squamules rounded, nearly entire, imbricated, pale green above, white beneath; podetia short, simple, tubular, smooth and naked. Apothecia solitary, capitate, convex, brown.

Cenomyce leptophylla, Ach. L. Univ. 568.—*Lichen microphyllus*, Smith E. Bot. 1782.—*Scyphophorus microphyllus*, Hook. Brit. Fl. 2. 237.—*Cladonia squamosa, var. leptophylla*, Schær. Enum. 199.

On the ground among moss on heaths and commons, on old mossy and decayed trees in shady woods, and on rocks in damp situations in alpine districts; all common except the two last varieties. *Mr. Carroll* furnished me with a fine example of *cæspititia*, from Duncombes Wood! near Cork. The variety *leptophylla*, I have not seen. The spermogones are of common occurrence, and are either solitary on the subulate apices of the podetia, or on the lobes of the thallus; or grouped on the margins of the scyphi, or on the apices of simple elongated narrow podetia; in size and form they differ but little, if any, from those of *C. gracilis*. The sterigmata are simple, palmately divided. The spermatia are exceedingly abundant, in fact, when a spermogone is placed with a drop of water between two glass slides, and then subjected to a gentle pressure beneath the microscope, they issue out of the ostiolum in a long dense stream, or thick cloud, which from its density often appears as if coloured; in form they are acicular and curved, and about ·00125 to ·00175 in. long, by ·00015 in. broad.

6. CLADONIA FURCATA, (*Huds.*) Thallus squamulose, more or less evanescent; podetia elongated, glaucous white, or brownish-green, smooth, or squamulose, subdichotomously-fruticulose; axils and fertile apices pervious, sterile ones subulate, furcate. Apothecia pedicellate, from pale brown becoming dark brown.

Lichen subulatus, β *furcatus*. Huds. Angl. 2. 556.

α. CRISPATA, (*Ach.*) Podetia short, turgido-cylindrical, naked or squamulose; apices and axils infudibuliform, repeatedly proliferous, the margin of the openings dilacerato-dentate.

Cenomyce crispatus, Ach. Syn. 272.—*Cladonia furcata a. crispata*, Fries L. Ref. 229.—Kbr. S. L. G. 34.—C. *ceranoides*, Schær. Enum. 197, L. H. 276!

β. RACEMOSA, (*Hoffm.*) Podetia elongated, inflato-cylindrical, irregularly branched; branches recurved or erect, the fertile ones explanate.

Cladonia racemosa, Hoffm. D. Fl. 2. 114.—*C. furcata, var. racemosa,* Fries L. Ref. 230.—Schær. Enum. 202.—*C. furcata, γ.* Hook. Brit. Fl. 2. 236.

A. ERECTA, (*Fw.*) Podetia erect, naked, or rarely subsquamulose.

Kbr. S. L. G. 34.—Schær. L. H. 80!—Nyl. L. P. 23!—Leight. Exs. 16!

B. RECURVA, (*Hoffm.*) Podetia elongated, squamulose, their apices more or less reflexed.

Hoffm. D. Fl. 2. 115.—Schær. Enum. 202, L. H. 80, A!

γ. SUBULATA, (L.) Podetia elongated, slender, smooth, or slightly squamulose, greyish-brown, dichotomously branched; branches subulate, ascendant. Apothecia solitary, or aggregated, brown.

Lichen subulatus, L.—*Cladonia furcata, var. subulata,* Fries L. Ref. 230.—Schær. Enum. 202, L. H. 81!—Hook. Brit. Fl. 2. 236.—Kbr. S. L. G. 35.—Nyl. L. P. 22!

δ. PUNGENS, (*Smith*). Thallus none; podetia slender, erect or ascendant, naked, greyish-white, very much and divaricatedly branched; branches fragile, their extremities furcellate, subpungent. Apothecia minute, solitary, or aggregated, dark-brown.

Lichen pungens, Sm. E. Bot. 2444.—*Cladonia furcata var. pungens,* Fries L. Ref. 230.—*C. pungens,* Hook. Brit. Fl. 2. 235.—Kbr. S. L. G. 35.—*C. furcata, var. rangiformis,* Schær. Enum. 202, L. H. 459!

B. DECUMBENS, (*Mudd.*) Podetia larger, loosely decumbent, naked, verruculose, greenish-grey, intricately and divaricatedly branched; branches ascendant, the extremities furcellate.

On the ground, on heaths in alpine and subalpine districts, all more or less common. *Lichen pungens* only differs from the ordinary forms of *furcata,* by its thallus being invariably of a paler colour, and by the extremities of its branches being furcellate and more or less pungent. The variety *decumbens* is a large form, with a loose, straggling habit, and is generally met with in wet places on open moors. *α. crispata* is apparently rare in this country, at least the typical form; I have a single specimen collected some years ago on Kildale Moor! Cleveland. The Spermogones of all the varieties are of common occurrence. They are in general seated on the apices of the bifurcate or simple ramuli of the podetia, rather larger in size than usual, deep-brown, having an elliptico-oblong, or subspherical outline. The ostiole is also frequently rather larger than common. The sterigmata are of the ordinary form, simple, palmatifid. The spermatia, in many spermogones, occur in very great abundance, in others more sparingly, and in some others none, the sterigmata being elongated and sterile; they are chiefly cylindrico-arcuate, but at times they appear nearly straight, ·0015 to ·00175 in. long, by ·0001 to ·00012 in. broad.

7. CLADONIA RANGIFERINA, (L.) Thallus crustaceous, evanescent; podetia elongated, erect, rugulose, greenish-white, or greyish-brown, cylindrical, very much branched, the axils more or less perforated; branches intricate, divaricated, the sterile apices drooping, fertile ones erect, cymose. Apothecia subglobose, brown.

Lichen rangiferinus, L.—Sm. E. Bot. 173.—*Cladonia rangiferina,* Hoffm.—Hook. Brit. Fl. 2. 235.—α. Fries L. Ref. 243.—Schær. Enum. 203, L. H. 76! et 77!—Kbr. S. L. G. 36.—Leight. Exs. 57!

β. SYLVATICA, (L.) Podetia slender, nearly smooth, pale straw-coloured; branches lax.

Lichen rangiferinus, β. sylvaticus, L.—*Cladonia rangiferina, β. sylvatica,* Fries L. Ref. 243.—Schær. Enum. 203, L. H. 78!

γ. ALPESTRIS, (L.) Podetia rather soft, divaricatedly branched, the terminal branches and branchlets very densely thyrsoid-entangled.

Lichen rangiferinus, var. alpestris, L.—*Cladonia rangiferina, var. alpestris,* Fries L. Ref. 243.—Schær. Enum. 203, L. H. 79!

On the ground on heaths and commons; α. and β. abundant in alpine and subalpine districts, γ. less frequent. Spermogones tuberculiform, seated on the apices of the drooping or erect ramuli of the podetia, solitary, or grouped two or more together, generally of an ellipticooblong figure, minute, usually much smaller in all their dimensions than those of *C. furcata.* Sterigmata simple palmatifid, at times sterile, and elongated. Spermatia very minute, cylindrico-arcuate, or nearly straight, ·00075 to ·001 in. long, by ·0001 in. broad.

8. CLADONIA UNCIALIS, (L.) Thallus crustaceous, evanescent; podetia elongated, smooth, pale yellowish-white, cylindrical, dichotomously branched, the axils more or less perforated; sterile apices subulate, or furcate, erect, dark-brown, or nearly black; fertile ones, digitato-radiate. Apothecia minute, at first pale brown, afterwards darker.

Lichen uncialis, L.—Sm. E. Bot. 174.—*Cladonia uncialis,* Fries L. Ref. 244.—Hook. Brit. Fl. 2. 234.—*C. stellata,* Schær. Enum. 200.

A. HUMILIOR, (*Fries*). Podetia slender, smooth, rigid, the axils often imperforated; apices stellulate or bifurcate, sterile.

Cladonia uncialis, b. humilior, Fries L. Ref. 244.—*C. stellata, α. uncialis,* Schær. Enum. 200, L. H. 82!—Leight. Exs. 58!

B. ELATIOR, (*Fries*). Podetia larger, elongated, somewhat turgid and thickened, flexuose, sparingly branched, the axils perforated, open; apices stellulate, simple, or furcate, the fertile ones cymose.

Cladonia uncialis, α. Fries L. Ref. 244.—*C. stellata, β. biuncialis,* Schær. Enum. 200. L. H. 513!—*C. stellata, β. adunca,* Kbr. S. L. G. 37.

C. TURGESCENS, (*Fries*). Podetia soft, turgid, and thickened, the branches truncate, fastigiate, the fertile ones digitately divided, open; sterile ones denticulato-stellate, closed.

Fries L. Ref. 244.—*C. stellata var. turgescens,* Schær. Enum. 200, L. H. 84!—*C. uncialis, β. turgida,* Hook. Brit. Fl. 2. 235. (excl. L. *turgidus,* Ehrh.)

On the ground on heaths and moors, generally in damp or shady situations; common,—c. *turgescens,* is less frequent, and apparently confined to wet heaths in alpine districts,—*Lichen* (*Cladonia*) *turgidus,* EHRH., according to KOERBER'S description, is a totally different plant to ours.

SUBSECT. D.—(PYCNOTHELIA, *Duf.*) *Thallus crustaceous, persistent; podetia short papillæform, simple or divided. Apothecia terminal, convex, brown.*

9. CLADONIA PAPILLARIA, (*Ehrh.*) Thallus crustaceous, papilloso-granulated, greyish-green; podetia short, glabrous, from white becoming

glaucous, at first papillæform, afterwards ventricoso-cylindrical, simple or divided, the branches subfastigiate; sterile apices obtuse, papillate, brown, often spermogoniferous. Apothecia terminal, solitary or grouped, convex, brown.

Lichen Papillaria, Ehrh. in H. N. 1783. p. 218 (fide Schær.).—Sm. E. Bot. 907.—*Cladonia Papillaria,* Hoffm. Fries L. Ref. 245.—Schær. Enum 203, L. H. 511 ! et 512.—Nyl. L. P. 107 !—Leight. Exs. 208 ! —Kbr. S. L. G. 37.—*Pycnothelia Papillaria,* Hook, Brit. Fl. 2. 241.

On the ground on heaths and commons in dry exposed situations; plentiful in subalpine and alpine districts. The spermogones are usually present, and more or less abundant. They are either solitary and seated on the apices of the short podetia, or congregated about their base, or irregularly scattered over the crustaceous thallus. They are small tuberculiform, having an oblong outline, and somewhat flattened at the apex, of a rich reddish-brown colour when recent, dull dark-brown when dry; ostiole large and easily perceptible. The sterigmata are simple, generally palmato-multifid, at times sterile and much divided and elongated. The spermatia are ordinarily abundant, acicular, curved, ·002 in. long, by ·00012 in. broad.

SECT. 2. ERYTHROCARPÆ.—*Apothecia scarlet.*

10. CLADONIA COCCIFERA, (*L.*) Thallus squamulose, or squamuloso-subfoliaceous, roundly or inciso-lobed, glaucous or pale green above, white beneath; podetia variously elongated, naked, pulverulent, verruculose, or rugoso-squamulose, scyphipherous; scyphi narrow, variously proliferous. Apothecia scarlet, solitary, or symphicarpous; spores as in the genus. PLATE 1. *fig.* 11.

Lichen cocciferus, L. et Auct.

α. CORNUCOPIOIDES, (*L.*) Thallus squamulose; squamules inciso-lobed, glaucous green above, white beneath; podetia short, verruculose, or granuloso-subpulverulent, from pale yellow becoming greyish-green, turbinato-scyphiferous; scyphi cyathiform, dilated, the margins denticulato-crenate, at length proliferous. Apothecia scarlet.

Lichen Cornucopioides, L. et Auct.

A. EXTENSA, (*Hoffm.*) Podetia elongato-turbinate; scyphi dilated, proliferous from the margins. Apothecia large, scarlet.

Cladonia coccinea, var. extensa, Hoffm. D. Fl. 2. 123.—*C. extensa,* Schær. Enum. 187, L. H. 51 !—*C. cornucopioides, α. coccifera,* Kbr. S. L. G. 28.

B. PLEUROTA, (*Flk.*) Podetia short, hoary-pulverulent; scyphi dilated, denticulato-crenate, or digitate. Apothecia small, terminal, scarlet.

Capitularia pleurota, Flk. in Berl. Mag. 1808. p. 222 (fide Schær.)—*Cladonia pleurota,* Schær. Enum. 186, L. H. 50 !—*Lichen cocciferus,* Sm. E. Bot. 2051.—*Scyphophorus cocciferus,* Hook. Brit. Fl. 2. 240.

β. BELLIDIFLORA, (*Ach.*) Thallus squamuloso-subfoliaceous; squamules inciso-crenate, pale green above, white beneath; podetia elongated, from verruculose becoming rugoso-squamulose, greyish-green, cylindrical, or tubæform, scyphiferous; scyphi very narrow, often proliferous. Apothecia scarlet, conglomerate, or symphicarpous.

Lichen bellidiflorus, Ach. Prod. 194.—Sm. E. Bot. 1894.—*Cladonia bellidiflora,* Fries L. Ref. 237.—Schær. Enum. 189, L. H. 39 ! 40 ! 41 !

et 42 !—Kbr. S. L. G. 29.—Nyl. Enum. Gen. 96.—*Scyphophorus bellidiflorus,* Hook. Brit. Fl. 240.

γ. FLOERKEANA, (*Fries*). Thallus squamulose, squamules inciso-lobed greenish-white above, white beneath; podetia rather short, slender, at first glabrous, becoming at length granulato-verrucose, or granulato-squamulose, greyish-white above, darker at the base, cylindrical, obscurely scyphiferous; scyphi passing into digitate fastigiate branches. Apothecia large, terminal, scarlet.

Cladonia Floerkeana, Fries L. Ref. 238.—Kbr. S. L. G. 29.—Nyl. Enum. Gen. 96.—Hepp. Eur. 290 ! et 291 !—*C. macilenta, var. divisa,* et, *epiphylla,* Schær. Enum. 186, L. H. 36 ! et 38 !—*Lichen digitatus,* Smith E. Bot. 2439. — *Scyphophorus digitatus,* Hook. Brit. Fl. 2. 240.

δ. DEFORMIS, (L.) Thallus squamulose; squamules inciso-lobed, pale green above, white beneath; podetia elongated, greyish-white, becoming sulphureo-pulverulent in the upper part, tubæform, or cylindrico-ventricose, scyphiferous, or subulate and sterile. Apothecia small, scarlet.

Lichen deformis, L. et Auct.

A. TUBÆFORMIS, (*Kbr.*) Podetia elongated, tubæform, sulphureo-pulverulent above, scyphiferous; scyphi somewhat narrow, at length cyathiform, with an erect crenato-denticulated margin, rarely proliferous.

Cladonia crenulata, α. tubæformis, Kbr. S. L. G. 30.—*C. deformis,* Fries L. Ref. 239. in pt.—*C. deformis, α. crenulata,* Schær. Enum. 188, L. H. 48 !—Hepp. Eur. 292 !

B. SUBULATA, (*Schær.*) Podetia elongated, grey, or sulphureo-pulverulent, cylindrical, or ventricose, irregularly scyphiferous, or subulate and sterile; scyphi narrow, the margins more or less crenato-dentate.

Cladonia deformis, var. *subulata,* Schær. Enum. 188, L. H. 47 !—*Lichen deformis,* Sm. E. Bot. 1394 —*C. deformis,* Fries L. Ref. 239. in pt.—Leight. Exs. 275 ! et 297 !—*Scyphophorus deformis,* Hook. Brit. Fl. 2. 240.—*C. crenulata, γ. deformis,* Kbr. S. L. G. 30.

ε. DIGITATA, (*Hoffm.*) Thallus squamulose; squamules roundly or inciso-lobed, yellowish or greyish-green above, white beneath; podetia more or less elongated, becoming yellowish pulverulent above, cylindrical, or elongato-turbinate, scyphiferous; scyphi narrowed, with an incurved, entire margin, eventually enlarged, the margin palmato-proliferous. Apothecia minute, scarlet.

Cladonia digitata, Hoffm. D. Fl. 124.—Fries L. Ref. 240.—Schær Enum. 188, L. H. 43 ! et 44 !—Kbr. S. L. G. 30.—Nyl. L. P. 25 !—*Lichen cornutus,* Sm. E. Bot. 1836.—*Scyphophorus cornutus,* Hook. Brit. Fl. 2. 239.

ζ. DIGITATO-RADIATA, (*Schær.*) Podetia squamuloso-rugose at their base, grey or yellowish-pulverulent above, irregularly elongato-turbinate, or tubæform; scyphi narrow, the margins digitato-radiate, proliferous.

Cladonia digitata, var. digitato-radiata, Schær. Enum. 188, L. H. 45!

η. MACILENTA, (Ehrh.) Thallus squamulose; squamules inciso-lobed, pale green above, white beneath; podetia more or less elongated, slender, pale yellowish-white, naked, hoary-pulverulent, or furfuraceo-squamulose, cylindrical, obscurely scyphiferous, or scyphiferous; scyphi narrow, tubæform, the margins entire or digitato-radiate, proliferous. Apothecia small, scarlet.

Lichen macilentus, Ehrh. Crypt. 267.—*Cladonia macilenta,* Fries. L. Ref. 240.

A. POLYDACTYLA, (*Flk.*) Podetia more or less elongated, slender, hoary-pulverulent, becoming furfuraceo-squamulose, irregularly tubæform-scyphiferous; scyphi narrow, the margins digitato-radiate, repeatedly proliferous. Apothecia small, scarlet.

Cladonia polydactyla, Flk. Comm. 108.—*C. macilenta, β.* Fries L. Ref. 241.—Schær. Enum. 186, L. H. 454!—Leight. Exs. 274!—Kbr. S. L. G. 31.

B. CORYMBIFORMIS, (*Flk.*) Podetia elongated, pale yellowish-pulverulent, simple, stipiform, cylindrical, scyphiferous; scyphi proliferous, passing into numerous very short fastigiate branches, forming a dense corymbose head.

Cladonia polydactyla, γ. corymbiformis, Flk. Comm. 114.—*C. macilenta,* Fries L. Ref. 241.—Kbr. S. L. G. 31.

C. FILIFORMIS, (*Relh.*) Podetia more or less elongated, slender, pale yellow, or hoary-pulverulent, simple, stipiform, cylindrical, obscurely scyphiferous; scyphi very narrow, the margins entire. or dentated.

Lichen filiformis, Relh.—Sm. E. Bot. 2028.—*Cladonia, macilenta, α.* Fries L. Ref. 240.—Schær. Enum. 186, L. H. 33! et 35!—Kbr. S. L. G. 31.—*Scyphophorus filiformis,* Hook. Brit. Fl. 2. 239.

D. OBTUSA, (*Schær.*) Podetia simple, or somewhat divided above, clavæform. Apothecia large, solitary, or symphicarpous, scarlet.

Cladonia macilenta, var. obtusa, Schær. Enum. 186, L. H. 34!—*C. macilenta, var.* Hepp. Eur. 113!—*C. bellidiflora,* Leight. Exs. 56!

E. RUBIFORMIS, (*Sm.*) Thallus squamulose; squamules crenato-lobed, pale yellowish-green above, white beneath, the margins more or less pulverulent; podetia none, or very short, stipiform. Apothecia shortly stipitate or subsessile on the disc of the squamules, very minute, globose, bright-red, or scarlet when young, dark-red when old, immarginate.

Lichen rubiformis, Smith E. Bot. 2112.—*Psora rubiformis,* Hook. Brit. Fl. 2. 193?. (non *C. filiformis, var. rubiformis,* Schær. L. H. 38!)

On the ground on heaths and moors, near the roots of trees, on dead wood, rocks, &c.; all common in mountainous districts. I cannot but regard all the British *Cladoniæ* possessing scarlet apothecia, as forms of one species; as the same visible relationship exists in the different forms which it assumes, as is to be found in *C. gracilis, cervicornis, hybrida, degenerans,* &c., or in *C. pyxidata* and *fimbriata.* The spermogones are similar in all the varieties. They are tuberculiform, usually seated on the margins of the scyphi, and at first scarlet, becoming with age dark-brown; in fact, the brilliancy of their colour is also much affected by drying, as is also that of their apothecia; their presence adds materially to the elegant and beautiful appearance of their podetia and scyphi; as they frequently form a kind of fringe around the margin of the latter, or terminate the apices of their dentations. The sterigmata are of the ordinary form, simple, palmatifid. The spermatia are often very abundant, and usually mixed with a rose-coloured mucilage; they are acicular, curved, ·00125 to ·00175 in. long, by ·0001 in. broad.

SUBTRIBE 2. BÆOMYCEÆ, (*Fée*).

Thallus effuse, crustaceous. Apothecia stipitate, or sessile, cephaloid and immarginate, or patellæform, and margined by a thin compound exciple; internally lacunose, or solid.

GENUS 2. BÆOMYCES, (*Pers.*)

Apothecia stipitate, pileiform, or globose, immarginate; internally solid, or empty and araneous; thalamium either covered by a thin fugacious thallodal veil, or glabrous, ceraceo-gelatinous, arising from a grumoso-carnose, simple hypothecium; asci elongato-cylindrical, attenuated at the base, 6-8 spored; spores elliptical, elliptico-fusiform, or linear-fusiform, often incurved, or flexuose, unilocular, uncoloured. Thallus crustaceous, uniform.

1. BÆOMYCES BYSSOIDES, (L.) Thallus effuse, thinnish, leproso-granulose, greenish-white or grey; hypothallus fibrillose, white. Apothecia pileiform, reddish-brown, plano-convex; stipes short, subcompressed, costate; asci elongato-cylindrical, attenuated at the base, 8 spored; spores elliptical-oblong, unilocular, hyaline; ·001 to ·00125 in. long, by ·0005 in. broad.

Lichen Byssoides, L.—Smith E. Bot. 373.—*Bæomyces rufus*, Wahl. Ach. Syn. 280.—Hook. Brit. Fl. 2. 137.—*Biatora Byssoides*, Fries L. Ref. 257.—*B. byssoides*, Schær. Enum. 183, L. H. 32 !—Leight. Exs. 178 !—Massal. Ric. 139, fig. 274.—*Sphyridium fungiforme*, Kbr. S. L. G. 273.—*B. rufus*, Nyl. L. P. 27 ! Enum. Gen. 93.

On rocks and old walls in damp shady places, also on the ground on sandy heaths; common in subalpine districts.

2. BÆOMYCES PLACOPHYLLUS, (*Ach.*) Thallus orbicular, tartareous, corrugato-plicate in the centre, lobed and crenate at the circumference, glaucous-white. Apothecia pileiform, from red becoming brown, slightly convex; stipes compressed; asci 6-8 spored; spores fusiform, slightly incurved, unilocular, hyaline; ·0025 in. long, by ·0005 in. broad.

Bæomyces placophyllus, Ach. Meth. 323.—Hook. Brit. Fl. 2. 137—Schær. Enum. 183.—Nyl. Enum. Gen. 94.—*Biatora placophylla*, Fries L. Ref. 257.

On the earth in sandy places, wall tops, &c.; very rare. Baldovan ! Scotland, *Mr. W. Gardiner*.

3. BÆOMYCES ROSEUS, (*Pers.*) Thallus tartareous, verrucoso-papillate, white; hypothallus effuse glaucescent. Apothecia subglobose, pale rose or flesh-colour; stipes very short, nearly round, white; asci very narrow, linear, attenuated at the base into an elongated pedicle, 8 spored; spores linear-fusiform, incurved, unilocular, sometimes faintly bilocular, hyaline; ·004 to ·006 in. long, by ·0005 in. broad. PLATE 1. *fig.* 12.

Bæomyces roseus, Pers.—Fries L. Ref. 246.—Hook. Brit. Fl. 2. 137.—Schær. Enum. 182, L. H. 31 !—Massal. Ric. 138. fig. 273.—Hepp Eur. 119 !—Nyl. L. P. 26 ! Enum Gen 93.—Kbr. S. L. G. 274.

Upon the ground on heaths in damp places; common in subalpine districts. All the species in the present genus are well characterised by their differently coloured thallus, and the external form and size of their spores. *Bæomyces microcephalus*, Tayl. Fl. Hib. pt. 2. 78., according to authentic specimens, which I have been permitted to examine through the kindness of Mr. Carroll, is a *fungus*, consequently a description of it is here omitted.

GENUS 3. ICMADOPHILA, (*Ehrh.*)

Apothecia patellæform, margined by a thin compound exciple, becoming subimmarginate, or immarginate; internally solid; thalamium arising from a tough, simple hypothecium; asci cylindrical, attenuated at the base, 8 spored; spores subfusiform, bilocular, uncoloured. Thallus crustaceous, uniform; Hypothallus white.

A small genus, consisting of one species, which was usually associated with the *Lecideæ* in the older arrangements. Recently MASSALONGO assigned it to a separate genus, founded on the formation and nature of the apothecia and the external form and internal organization of the spores. KOERBER, also, adopts the same mode, and arranges it after *Ochrolecia* in his subfamily *Lecanorineæ*. DR. NYLANDER shews its nearer affinity to *Bæomyces*, and includes it in that genus, assigning it a separate section. I look upon it as being only *allied* to Bæomyces in general appearance and habit, and prefer its separation, on account of its constantly *sessile, solid apothecia*, and subfusiform, *bilocular spores*.

1. ICMADOPHILA AERUGINOSA, (*Scop.*) Thallus effuse, tartareous, granulato-leprose, greenish-grey or white. Apothecia elevato-sessile, rather soft, or somewhat fleshy when growing; disc plane, or somewhat convex, slightly pruinose, flesh-coloured, surrounded by a thin paler evanescent margin; asci cylindrical, attenuated at the base into a short predicle, 8 spored; spores subfusiform, bilocular, hyaline; ·0035 to ·0045 in. long, by ·001 in. broad. PLATE 1, *fig.* 13.

Lichen aeruginosus, Scop. Fl. Car. 78.—*Lichen ericetorum*, Sm. E. Bot. 372.—*Lecidea icmadophila*, Ach. Syn. 45.—Hook. Brit. Fl. 2. 184. —*Biatora icmadophila*, Fries L. Ref. 258.—Leight. Exs. 209 !—*Lecidea aeruginosa*, Schær. Enum. 142, L. H. 216 !—*Biatora aeruginosa*, Hepp. Eur. 137 !—*Icmadophila aeruginosa*, Massal. Ric. 26. fig. 42.—Kbr. S. L. G. 151.—*Bæomyces icmadophilus*, Nyl. Enum. Gen. 94.

On turfy heaths in shady situations, and sometimes on rotten wood; common in subalpine districts. Easily distinguished by its greenish-white thallus, and pale flesh-coloured, subimmarginate, sessile, apothecia.

SUBTRIBE 3. STEREOCAULEÆ.

Thallus fruticuloso-caulescent, solid, erect or ascendant, arising from a more or less evanescent, horizontal, adnate, granulose thallus; the upper parts clothed, to a greater or less degree, with squamuloso-granulose excrescences. Apothecia turbinato-dilated, solid, margined by a, more or less evident, thallodal exciple, becoming cephaloid, and immarginate.

GENUS 4. STEREOCAULON, *Schreb.*

Apothecia terminal or lateral, at first turbinate, margined by a thallodal exciple, at length dilated, the thallodal exciple becoming more or less evanescent, or converted into a proper one, eventually cephaloid and immarginate; thalamium arising from a thickish, simple hypothecium; asci linear-cuneate, 4 to 6 spored; spores acicular, elongato-subclavate, or fusiform, from 2 to 8 locular, internally subgranular, pale yellow, or hyaline. Thallus fruticuloso-caulescent, solid, arising from a more or less evanescent, horizontal, adnate, granulose thallus; the upper parts clothed, to a greater or less degree, with squamuloso-granulose escrescences.

As in the genus *Cladonia*, so here in the present one, the species seem to me to have been multiplied unnecessarily, and to be characterised by too feeble and fickle features.

SECT. A. *Horizontal thallus evanescent.*

1. STEREOCAULON TOMENTOSUM, (*Fries.*) Podetia stout, rounded, spongioso-tomentose, loosely branched; branches somewhat recurved, clothed with inciso-crenate, greyish-white squamules. Apothecia terminal and lateral; disc at first plane, afterwards globoso-convex, dark-red, or reddish-brown; asci linear-cuneate, 4-6 spored; spores acicular, or subclavate, flexuose, 2-8 locular, subhyaline, or hyaline; ·006 to ·008 in. long by ·0005 to ·00075 in. broad.

Stereocaulon tomentosum, Fries L. Ref. 201.—Schær. Enum. 181, in pt.—Hepp. Eur. 302!—Nyl. Enum. Gen. 97.—Kbr. S. L. G. 11.

On the earth in stony places, and on rocks in alpine districts; rare. Scotland! *Mr. W. Gardiner*. Apparently a distinct species; and it is one, which may be readily recognised, by its stout podetia being clothed with a dense whitish tomentum.

2. STEREOCAULON PASCHALE, (*L.*) Podetia rather slender, somewhat compressed, lax, very much branched; branches densely crowded together, clothed with foliaceo-granulose, crenate, glaucous squamules; the apices conglomerate. Apothecia terminal, or subterminal, mostly solitary; disc dilated, plane, reddish-brown; eventually subglobose, brownish-black; asci linear-cuneate, 4-6 spored; spores acicular or clavate, flexuose, 2-8 locular, internally subgranular, or hyaline; ·005 to ·009 in. long, by ·0005 to ·00075 in. broad.

α. PASCHALE, (*L.*)

Lichen paschalis, L.—Smith E. Bot. 282.—*Stereocaulon paschale*, Ach. Syn. 284 in pt.—Hook. Brit. Fl. 2. 233.—Fries L. Ref. 202.—Leight. Exs. 148!—Schær. Enum. 181.—Kbr. S. L. G. 12.—Nyl. Enum. Gen. 96.

On the ground in stony places, and on rocks in alpine districts. Abdon Burf! Shropshire, *Rev. W. A. Leighton*. Old walls, Caerlarerock road! Dumfries, and opposite Birnam! Dunkeld, *Dr. Lindsay*. Connor Cliff! Dingle, Ireland, *I. Carroll, Esq*. Sussex! *Mr. John Hemmings*. Falcon Clints, Teesdale, Durham.

β. CORALLINUM, (*Laur.*) Podetia slightly compressed, cæspitose, very much branched, glabrous; branches densely crowded in the upper part, and clothed with subdigitato-coralline, greenish-white squamules. Apothecia terminal and lateral, solitary, or conglomerate; disc plane, at length globose, from pale-brown becoming reddish-brown, or dark-red; spores acicular, or clavate, flexuose, 2-8 locular, hyaline; ·006 to ·008 in. long, by ·0005 to ·00075 in. broad. PLATE 1. *fig.* 14.

Stereocaulon corallinum, Laur.—Fries L. Ref. 201.—Schær. Enum. 180, L. H. 261!—Hepp. Eur. 114!—Kbr. S. L. G. 11.

On the earth in stony places, and on rocks in alpine districts. Roadside between Portree and Sligachan, Skye! *Dr. Lindsay* Teesdale! Durham, *Rev. J. Harriman.*

γ. ALPINUM, (*Laur.*) Podetia lax, rounded, naked, or sprinkled here and there with a very thin white or greyish tomentum, more or less branched and clothed with conglomerate and crenate, granulose, glaucous-white squamules. Apothecia terminal and lateral, scattered; disc dilated, at length convex, dark-red or brownish-black; asci 4-6 spored; spores acicular or subclavate, flexuose, 2-8 locular, internally subgranular, or hyaline; ·006 to ·008 in. long, by ·0005 to ·00075 in. broad.

Stereocaulon alpinum, Laur.—Fries L. Ref. 204.—Schær. Enum. 182. L. H. 263!—Kbr. S. L. G. 15.—Hepp. Eur. 303!

B. BOTRYOSUM, (*Ach.*) Podetia somewhat naked below, very much branched above, the apices passing into densely conglomerated granules.

Stereocaulon botryosum, Ach. Syn. 284.—Hook. Brit. Fl. 2. 233.—*S. alpinum*, β. Fries L. Ref. 204.—Schær. Enum. 182, L. H. 264!

On the earth in stony places, and on rocks in alpine districts. Galtymore! Brandon! and near Blackwater Bridge! Ireland, *I. Carroll, Esq.* Summit of Birnam Hill! Dunkeld, Summit of Ben Lawers! and Blaeberry Hill! Perth, Scotland, *Dr. Lindsay.* Falcon Clints! Teesdale, Durham.

δ. DENUDATUM, (*Flk.*) Podetia erect, or nearly so, rounded, subulato-attenuated, sparingly branched above, naked below, glabrous, more or less clothed with subrotund greyish squamules, becoming at length nearly plane, and crenato-lobed. Apothecia lateral, minute; disc nearly plane, dark-brown; spores acicular or clavate, flexuose, 2-8 locular, subhyaline or hyaline; ·005 to ·008 in. long, by ·0005 to ·00075 in. broad.

Stereocaulon denudatum, Flk. D. Lich. 79.—Fries L. Ref. 204.—Schær. Enum. 179.—Kbr. S. L. G. 13.—Nyl. Enum. Gen. 97.

On rocks in alpine districts. Ben Nevis! Lochaber, *Dr. Lindsay.* Teesdale! Durham, *J. G. Baker, Esq.* Co. of Antrim! from two localities! *D. Moore, Esq.* The four forms just described appear to me to be only varieties of one species. Indeed some of them can hardly be said to be even varieties, the difference being in many specimens so very slight that I have often felt great difficulty in referring them to their respective place or head; and, I think, the appearance which they assume, may be traced very clearly to the action of the sun, to light or shade, moisture or drought, or stage of growth.

SECT. B. *Thallus persistent.*

3. STEREOCAULON CONDENSATUM, (*Hoffm.*) Thallus adnate, verrucoso-squamulose, persistent; podetia erect, rounded, minutely incarnato-tomentose, simple or slightly branched, clothed with subrotund, confluent

glaucous squamules. Apothecia terminal, subpeltate; disc dilated, plane, dark reddish-brown. Asci linear-cuneate, 4-6 spored; spores acicular or clavate, flexuose, 2-8 locular, internally subgranular or hyaline; ·005 to ·007 in. long, by ·0005 to ·00075 in. broad.

Stereocaulon condensatum, Hoffm. D. Fl. 2. 130.—Fries L. Ref. 203. —Schær. Enum. 178.—Kbr. S. L. G. 13.—Hepp. Eur. 300!—Nyl. Enum. Gen. 97.

On the ground in sandy or gravelly places, also on rocks. Teesdale, Durham! *Rev. J. Harriman,* Castleton! Braemar, *Admiral Jones.* Ayton Moor! and Battersby Moor! Cleveland, Yorkshire.

4. STEREOCAULON CEREOLINUM, Ach. Thallus rugulose, granuloso-verrucose, glaucous; podetia rounded erect, glabrous, simple or slightly divided at the summit, and more or less encrusted with verrucoso-coralline, glaucous squamules. Apothecia terminal; disc dilated nearly plane, from brown becoming brownish-black; hypothecium rather thick, dark reddish-brown; asci linear-cuneate, 4-6 spored; spores obtusely fusiform, quadrilocular, internally slightly granular, or hyaline; ·003 to ·004 in long, by ·001 to ·00125 in. broad.

Stereocaulon cereolinum, Ach. Syn. 285.—Kbr. S. L. G. 14.—Nyl. Enum. Gen. 97.—*S. Cereolus,* Borr in E. Bot. Supple. 2667.—Hook. Brit. Fl 2. 233.—Schær. Enum. 178.

On rocks in alpine districts. Near Eglestone! Durham, *Rev. J. Harriman.* Ben Nevis! *Admiral Jones.* Near the Giant's Causeway! Ireland, *D. Moore, Esq.* The short, rounded, and often nearly naked podetia, together with the obtusely fusiform spores, clearly and readily distinguish the present from all the preceding species.

5. STEREOCAULON NANUM, (*Ach.*) Thallus cæspitose, minute, floccoso-pulveraceous, pale yellowish-green; podetia rounded, very slender, flaccid, simple or branched; branches subfastigiate, encrusted with floccoso-pulverulent, pale yellowish-green granules. "Apothecia lateral, crowded, convex, dark-brown." Spores . . . . . . ?

Stereocaulon nanum, Ach. Syn. 285.—Hook. Brit. Fl. 2. 233.—Fries L. Ref. 205.—Kbr. S. L. G. 14.—Nyl. Enum. Gen. 97.—*S. quisquiliare,* Schær. Enum. 178, L. H. 588!

On the ground, and in the fissures of rocks, in alpine districts. Stenton Crag! Dunkeld, *Dr. Lindsay.* Cornwall! *Admiral Jones.* Malvern Hills! *E. Lees, Esq.*

SUBTRIBE 4. SIPHULEÆ, (*Nyl.*)

Thallus vertical, radiculoso-fruticulose, erect or elongato-subuliform, subsimple, prostrate; internally cottony, or hollow. Apothecia . . . . . ?

GENUS 5. THAMNOLIA, (*Ach.*)

Apothecia . . . . . . ? Spermogones irregularly verrucæform, concolorus with the thallus, and scattered without order over it; "sterigmata articulated; spermatia linear, straight." Thallus elongato-subuliform, subsimple, prostrate; internally hollow.

I adopt the present genus with much reluctance and doubt, never having had an opportunity of examining any species, constituting either the typical genus *Siphula*, or the present, in a fertile state; nor have I ever heard of their apothecia having been seen by others. The spermogonal verrucæ are comparatively common, but as yet I have failed to detect either *sterigmata* or *spermatia*. Dr. Lindsay, however, seems to have discovered them on *one* occasion. But although he has done so "in a single instance," and assures us that "the character of the spermogones at once separates it," from the genus *Cladonia*, in which the species has been hitherto included; still there is much uncertainty in the total absence of apothecia whether it *really is so or not.*

1. Thamnolia vermicularis, (*Sw.*) Thallus subuliform, prostrate, more or less curved, and undulated, white, simple, or slightly branched, the apices acute. Apothecia . . . . . . ?

Lichen vermicularis, Swartz.—Sm. E. Bot. 2029.—*Cladonia vermicularis*, Hook. Brit. Fl. 2. 234.—*Thamnolia vermicularis*, Schær. Enum. 243, L. H. 86.—Linds. Mem. Spermo. 143.—*Cladonia amaurocraea, β. vermicularis*, Kbr. S. L. G. 26.

On the ground among mosses, &c., on heaths in alpine districts. Ben Lawers! *Dr. Maingay.* Summit of Lochnagar! Braemar, *Dr. Lindsay.* The peculiar form of the thallus and habit will, in some measure, aid the student in the discrimination of both the present species and genus. Dr. Hooker likens it to small worms on account of its thallus lying prostrate on the ground, and from the shape of its branches.

Tribe 2. Usneaceæ, (*Eschw.*)

Thallus fruticulose, or subfruticulose, erect, pendulous, or sarmentose, branched or laciniated; branches round, cylindrico-compressed, or canaliculato-foliaceous. Hypothallus none. Apothecia scutelliform, margined by a thallodal exciple.

Subtribe 1. Usneæ.

Thallus fruticulose, at first erect, afterwards pendulous, much branched; branches round, repeatedly divided into small fibres; cortical stratum of one colour; medullary, solid, composed of hyaline filaments strongly agglutinated together. Apothecia peltate.

Genus 1. Usnea, (*Dill.*)

Apothecia orbicular, peltate, subterminal, margined by a thallodal exciple, which becomes radiato-ciliated; thalamium arising from a thin, simple, hypothecium; asci oblongo-obovate, 8 spored; spores oblong or elliptical, unilocular, hyaline. Thallus fruticulose, erect, or pendulous, much and repeatedly branched; branches round, their apices-fibrillose; cortical stratum of one colour.

1. Usnea barbata, (*Fries.*) Thallus rounded, irregularly branched, glaucous or greenish-grey, erect or pendulous; cortical stratum often annulato-cracked. Apothecia large, pale, the margin generally fibrilloso-radiated; spores oblong or elliptical, unilocular, hyaline; ·002 in. long, by ·001 in. broad. Plate 1. *fig.* 15.

α. FLORIDA, (*L.*) Thallus rounded, nearly erect, greenish-grey, scabrous, fruticulose, very much branched, the branches repeatedly divided into simple fibres. Apothecia large; disc plane, pale flesh-colour, margined with long radiating fibres or cilia; spores as above.

Lichen floridus, L.—Sm. E. Bot. 872.—*Usnea florida,* Ach. Syn. 304. Hook. Brit. Fl. 2. 226.—Kbr. S. L. G. 3.—*U. barbata, α. florida,* Fries L. Ref. 18.—Schær. Enum. 3.—*U. plicata, δ. florida,* Tayl. Fl. Hib. pt. 2, 86.

β. HIRTA, (L.) Thallus nearly erect, greenish-grey, subfruticulose; branches slender, much divided, scabrous, flexuose, often bearing sorediiferous excrescences, and at times spermogoniferous.

Lichen hirtus, L.—Sm. E. Bot. 1354.—*Usnea plicata, β.* Ach. Syn. 305.—Hook. Brit. Fl. 2. 226.—Tayl. Fl. Hib. pt. 2. 86.—*Usnea barbata, b. hirta,* Fries L. Ref. 18.—Schær. Enum. 3, L. H. 399!—Leight. Exs. 1!

γ. PLICATA, (*L.*) Thallus elongated, pendulous, pale glaucous or straw-coloured, smooth or somewhat scabrous; branches lax, fibrillose, subdichotomous, entangled, the ultimate fibrillæ capillaceous.

Lichen plicatus, L.—Sm. E. Bot. 257.—*Usnea plicata,* Ach. Syn. 305. —Hook. Brit. Fl. 2 226.—Tayl. Fl. Hib. pt. 2. 86.—Kbr. S. L. G. 3.—*Usnea barbata, c. plicata,* Fries L. Ref. 18.—Schær. Enum. 4, L. H. 401!

δ. DASOPOGA, (*Ach.*) Thallus pendulous, pale glaucous, or straw-coloured; the branches elongated, flaccid; fibrillæ simple, spreading horizontally.

Ach. Meth. 312.—Schær. Enum. 4, L. H. 402!

ε. ARTICULATA, (*L.*) Thallus pendulous, nearly smooth, glaucous or straw-coloured, very much branched, flaccid, the main stems articulated; articulations more or less inflated; lateral branches very long, slender, entangled, the apices capillary, spreading.

Lichen articulatus, L.—Sm. E. Bot. 258.—*Usnea barbata,* Ach. Syn. 306.—Hook. Brit. Fl. 2. 226.—*U. plicata, γ.* Tayl. Fl. Hib. pt. 2. 86.—*U. barbata. var. articulata,* Schær. Enum. 4, L. H. 497! *U. articulata,* Kbr. S. L. G. 4.

On the trunks and branches of trees, rocks, &c., all more or less common. The whole of the varieties here enumerated are closely allied to each other, and united together by intermediate states, and there can be little or no doubt that they all constitute, but one species.

SUBTRIBE 2. RAMALINEÆ, (*Fée.*)

Thallus fruticulose, erect, pendulous, or ascendant, filamentose and roundly-compressed, or subfoliaceous and compressed or dilated, concolorous on both sides, or discoloured; medullary stratum composed of hyaline filaments. Hypothallus none. Apothecia scutelliform, margined by a thallodal exciple.

GENUS 2. ALECTORIA, (*Ach.*)

Apothecia orbicular, scutelliform, margined by a thallodal exciple; thalamium arising from a simple hypothecium; spores "oblong, unilocular, subhyaline." Thallus fruticulose or filamentose, roundly compressed, or linear-laciniated; cortical stratum of one colour on both sides.

1. ALECTORIA JUBATA, (*L.*) Thallus at first fruticulose, erect, afterwards filamentose, pendulous, very much branched, olive-brown, blackish-brown, or grey; branches flaccid, very much entangled, smooth and shining, often bearing white sorediiferous excrescences, more or less compressed, especially at the axils; apices simple. "Apothecia lateral, innato-sessile; disc brownish-black. Spores oblong, unilocular."

Lichen jubatus, L.—Smith E. Bot. 1880 in pt.—*Alectoria jubata*, Ach. Syn. 291.—Hook. Brit. Fl. 2. 227.—Tayl. Fl. Hib. pt. 2. 86.—Nyl. Enum. Gen. 98.—*Evernia jubata*, c. *implexa*, Fries L. Ref. 21 —Leight. Exs. 72!—*Cornicularia jubata, var. prolixa*, Schær, Enum. 5, L. H. 397! —*Bryopogon jubatum*, α. *prolixum*, Kbr. S. L. G. 5.

β. CHALYBEIFORMIS, (*L.*) Thallus prostrate, subfilamentose, rather rigid, divaricatedly branched, brownish-black; branches short, remote, flexuose, more or less compressed at the axils.

Lichen chalybeiformis, L.—Smith E. Bot. 1880, in pt.—*Alectoria jubata*, var. *chalyb.* Ach. Syn. 291.—Hook. Brit. Fl. 2. 227.—*Evernia jubata*, b. Fries. L. Ref. 20.—*Cornicularia jubata*, β. Schær. Enum. 5, L. H. 396!

On the trunks and branches of old trees, especially Firs, also on rocks and old walls; very common in mountainous districts.

2. ALECTORIA BICOLAR, (*Ehrh.*) Thallus fruticulose, erect, rigid, smooth, divaricatedly branched, black or brownish-black; branches round, short, spreading, attenuated, the apices pale brown, and often somewhat curved. Apothecia......?

Lichen bicolar, Ehrh. Beytr. 3. 82.—Smith E. Bot. 1853.—*Cornicularia bicolar*. Ach. Syn. 301.—Hook. Brit. Fl. 2. 228.—*Evernia jubata*, a. Fries L. Ref. 20.—*Cornicularia jubata*, α Schær. Enum. 5. L. H. 495! —*Bryopogon jubatum*, β. Kbr. S. L. G. 5.—*Alectoria bicolar*, Nyl. Enum. Gen. 98.

On dry rocks among mosses, &c., in alpine districts. Stansfield moor! near Halifax, *J. G. Baker, Esq.* Penzance! *Mr. E. Parfitt.* Aberfeldy! Perthshire, *H. Macmillan, Esq.* Kildale moor! and High-cliff! Cleveland; and Farndale! Yorkshire. The general habit and appearance alone, seem to warrant the separation of the present from the preceding species. I have never heard of its apothecia being discovered.

3. ALECTORIA SARMENTOSA, (*Ach.*) Thallus procumbent, somewhat compressed, impresso-lacunose, pale greenish sulphur coloured, dichotomously branched; branches remote, smooth, very much divaricated, the ultimate ones short and capillary. "Apothecia lateral, sessile, disc concave, greenish flesh-coloured, surrounded by an entire margin." Spores......?

Lichen sarmentosus, Ach. Prod.—Sm. E. Bot. 2040.—*Alectoria sarmentosa*, Ach. Syn. 293!—Hook. Brit. Fl. 2. 227.—Nyl. Enum. Gen. 98.—*Evernia ochroleuca*, c. Fries L. Ref. 22.—*Cornicularia ochroleuca*, γ. Schær, Enum. 6.—*Bryopogon sarmentosum*, Kbr. S. L. G. 7.

In dry stony places on the Scottish mountains, creeping loosely over dwarf shrubs, mosses, &c. Summits of Morne! and Morchone! Braemar. *Dr. Lindsay.* The apothecia, I believe, have never yet been observed on British specimens.

4. ALECTORIA OCHROLEUCA, (*Ehrh.*) Thallus fruticulose, erect, rigid,

dichotomously branched, sorediiferous, pale sulphur-yellow; branches divaricated, rounded, hollow, the ultimate ones short and entangled; apices furcate, reflexed, bluish-black. "Apothecia innato-sessile, at length repand; disc brown, surrounded by an inflexed thallodal margin; asci sacciform, 4 spored; spores ovato-oblong, unilocular, sub-hyaline."

Lichen ochroleucus, Ehrh.—Smith. E. Bot. 2374.—*Cornicularia ochroleuca*, Ach. Syn. 69.—Hook. Brit. Fl. 2. 228.—*Evernia ochroleuca*, a. Fries L. Ref. 22.—*Corn. ochro. α. rigida*, Schær. Enum. 5, L. H. 395!—*Bryopogon ochroleuca*, Kbr. S. L. G. 6.—*Alectoria ochroleuca*, Nyl. Enum. Gen. 98.

On the earth, growing in dense erect tufts. Highlands of Scotland! *H. Macmillan, Esq:* Like the preceding, this also has never been found bearing apothecia in the British Islands. It resembles in so many respects *A. sarmentosa*, that both Fries and Schærer regard them as only one species; but I have seen too few specimens, and those infertile ones, to offer an opinion.

5. ALECTORIA VULPINA, *(L.)* Thallus subfruticulose, very much branched, bright lemon-yellow; branches divaricated, angular, lacunoso-rugose, more or less compressed at the axils; the ultimate branches slender, furcated, filiform. Apothecia small, sparingly produced, lateral, generally seated near the axils of the branches, sessile; disc concave, reddish-brown, surrounded by an inflexed thallodal margin; asci 8 spored; spores minute, oblong, or subglobose, unilocular, hyaline.

Lichen vulpinus, L.—*Evernia vulpina*, Fries L. Ref. 23.—*Cornicularia vulpina*, Schær. Enum. 6. L. H. 390!—*Evernia vulpina*, Kbr. S. L. G. 41.—*Chlorea vulpina*, Nyl. Enum. Gen. 98.

On the trunks of trees, especially Firs, and on old rails, &c., in alpine districts. On the trunks of trees, Killiney Hill, County Dublin, Ireland, *Mr. R. Jacobs*. The thallus of this very elegant species is frequently infested with a parasite, which has been named by TULASNE, *Phacopsis vulpina;* but, as it is not present on the Irish specimens, a description of it is omitted in this work. The spermogones of *A. vulpina*, are not of uncommon occurrence. They are minute, distinctly visible by the aid of an ordinary lens, papillæform, semi-immersed, or punctiform and wholly immersed, black, indiscriminately scattered on the angles of the ramuli, but most abundant towards their extremities. Sterigmata very distinct composed of two or three linear cells placed one above another. Spermatia numerous, rather large, cylindrical, ·0015 in. long, by ·00025 in. broad.

GENUS 3. EVERNIA, (*Ach.*)

Apothecia orbicular, scutelliform, lateral, margined by a thallodal exciple; thalamium arising from a simple hypothecium, which is placed upon the medullary stratum; asci obovate, or cuneate, 8 spored; spores elliptical, or subglobose, unilocular, uncoloured. Thallus ascending, subfoliaceo-compressed, branched and laciniated; under side canaliculated, of a different colour to the upper one; medullary stratum soft, composed of hyaline filaments.

1. EVERNIA FURFURACEA, (*L.*) Thallus subfoliaceous, ascending, greyish-green, divided into numerous dichotomous segments; laciniæ furfuraceous, linear-attenuated, the margins recurved; under side

canaliculated, reticulato-lacunose, black. Apothecia subpedicellate; disc reddish-brown, concave, surrounded by a thin, inflexed thallodal margin; asci short, cuneate, 6-8 spored; spores elliptical or subglobose, unilocular, hyaline or subhyaline; ·00175 in. long, by ·001 in. broad. PLATE 1. *fig.* 16.

Lichen furfuraceous, L.—Sm. E. Bot. 984.—*Borrera furfuracea*, Ach. Syn. 222.—Hook. Brit. Fl. 2. 223.—*Evernia furfuracea*, Fries L. Ref. 26.—Leight. Exs. 37!.—Kbr. S. L. G. 43.—*Parmelia furfuracea*, Tayl. Fl. Hib. pt. 2. 144.—*Physcia furfuracea*, Schær. Enum. 10, L. H. 387!.

On the trunks and branches of old trees, pales, old walls, &c., chiefly in subalpine districts. Apothecia rather rare. Eglestone! Durham, *Rev. J. Harriman.*

2. EVERNIA PRUNASTRI, (*L.*) Thallus subfoliaceous, ascending, soft, greenish-white, rugoso-lacunose, much divided and laciniated in a dichotomus manner; laciniæ linear-attenuated; under side subcanaliculated, white. Apothecia lateral, subpedicellate; disc bright brown, concave, surrounded by an inflexed thallodal margin; asci 6-8 spored; spores elliptical or subglobose, unilocular, hyaline or subhyaline; ·002 in. long. by ·001 in. broad.

Lichen prunastri, L.—Sm. E. Bot. 859.—*Evernia prunastri*, Ach. Univ. 442.—Fries L. Ref. 25.—Hook. Brit. Fl. 2. 224.—Tayl. Fl. Hib. pt. 2. 84.—Leight. Ex. 36!.—Kbr. S. L. G. 42.—*Physcia prunastri*, Schær. Enum. 11, L. H. 391!.

β. STICTOCERA, (*Smith.*) Thallus pale sulphur coloured, compressed, much divided; laciniæ divaricated, narrow, attenuated, concolorous on both sides.

Lichen stictoceros, Sm. E. Bot. 1353.—*Evernia prunastri*, β. Hook. Brit. Fl. 2. 224.

On the branches and trunks of trees, everywhere common.—β. "on the ground, upon broken sand banks, in the warren opposite Exmouth, Devonshire." I have not seen specimens of this variety.

GENUS 4. RAMALINA, (*Ach.*)

Apothecia orbicular, scutelliform, pedicellato-subpeltate, scattered on both sides of the thallus; disc of the thalamium plane, nearly of the same colour as the thallus, margined by a thallodal exciple; asci clavate, 6-8 spored; spores linear-oblong, straight or curved, bilocular, at times quadricellular, uncoloured. Thallus subfruticuloso-foliaceous, erect or pendulous, compressed, ramoso-laciniated, concolorous on both sides.

1. RAMALINA CALICARIS, (*Fries.*) Thallus cartilaginous, subfoliaceous, much branched and laciniated, pale glaucous, or greenish-grey. Apothecia pedicellate; disc plane, pale, nearly of the same colour as the thallus, surrounded by an elevated thallodal margin; asci subclavate, 6-8 spored; spores linear-oblong, more or less curved, bilocular, (at times the pale yellow oily protoplasm in each loculus, cleaves into two circular cells; when this is the case, the spores appear as if quadrilocular or quadricellular), pale yellow. or hyaline; ·003 to ·0035 in. long, by ·001 in. broad. PLATE 1. *fig.* 17.

Ramalina calicaris, Fries, L. Ref. 30.

α. FRAXINEA, (*L.*) Thallus pendulous, much branched and laciniated especially from near the base, reticulato-lacunose, glabrous, greenish-grey; laciniæ compressed, broadly-linear, more or less attenuated towards the extremities. Apothecia pedicellate, lateral, scattered on both sides of the laciniæ; disc plane or concave, pale, often concolorous with the thallus; margin thin, inflexed; spores as above.

Lichen fraxineus, L.—Sm. E. Bot. 1781.—*Ramalina fraxinea*, Ach. Syn. 296.—Hook. Brit. Fl. 2. 225.—Tayl. Fl. Hib. pt. 2. 84.—Kbr. S. L. G. 38.—*R. calicaris, α. fraxinea,* Fries L. Ref. 30.—Leight. Exs. 38!—*R. fraxinea, α. ampliata,* Schær. Enum. 9, L. H. 492!—Hepp. Eur. 167!

On the trunks and branches of trees, especially Ash, very common.

β. FASTIGIATA, (*Ach.*) Thallus erect, branched, lacunose, smooth, pale, glaucous-green; branches subcompressed, short, fastigiate. Apothecia subterminal, nearly sessile; disc plane or concave, pale, often nearly concolorous with the thallus; otherwise as above.

Lichen fastigiatus, Ach. Prod.—Sm. E. Bot. 890.—*Ramalina fastigiata,* Ach. Syn. 296.—Hook. Brit. Fl. 2. 225.—Tayl. Fl. Hib. pt. 2. 85.—*R. calicaris*, b. Fries L. Ref. 30.—Leight. Exs. 39!—*R. fraxinea, β. fastigiata,* Schær. Enum. 9, L. H. 491!—Kbr. S. L. G. 38.

On the trunks of trees; common everywhere.

γ. CANALICULATA, (*Fries*). Thallus subpendulous, dichotomously branched and laciniated, rigid, reticulato-lacunose, glaucous-grey; laciniæ-linear, elongated, canaliculated, and more or less attenuated towards the extremities. Apothecia affixed to the reflexed apices of the laciniæ; disc at first concave, afterwards convex, pale; margin thin, somewhat reflexed; otherwise as above.

Ramalina calicaris, c. canaliculata, Fries L. Ref. 30.—*R. fraxinea, γ. calicaris,* Schær. Enum. 9. L. H. 493!—*R. calicaris, α.* Kbr. S. L. G. 39.

On the trunks of trees, and sometimes on rocks; frequent, but not so common as either of the preceding.

δ. THRAUSTA, (*Ach.*) Thallus erect, or subpendulous, laciniated, rigid and fragile when dry, greenish-grey; lacinia very narrow, filiform, roundly-compressed, smooth, often sorediiferous; otherwise as in *γ. canaliculata.*

Alectoria thrausta, Ach. L. Univ. 596.—*Ramalina calicaris,* d. Fries L. Ref. 30.—*R. fraxinea,* δ. Schær. Enum. 9.

On rocks, in alpine and subalpine districts.

ε. FARINACEA, (*L.*) Thallus suberect or pendulous, much divided and laciniated, flaccid, sublacunose, sorediiferous, pale glaucous, or greenish-grey; laciniæ linear, undulated, and attenuated towards the extremities. Apothecia lateral; disc pale buff-coloured; spores as above.

Lichen farinaceus, L.—Sm. E. Bot. 889.—*Ramalina farinacea,* Ach. Syn. 297.—Hook. Brit. Fl. 2. 225.—Tayl. Fl. Hib. pt. 2. 85.—Schær. Enum. 8, L. H. 494!—Kbr. S. L. G. 40.—*R. calica., var. canali., subvar. farinacea,* Leight. Exs. 40!

On the trunks and branches of trees; common everywhere. The five forms here united into one species, are usually tolerably well characterised, and are easily distinguished from each other, as forms possessing intermediate characters are seldom met with. They are, however, undoubtedly, *only varieties of one species.*

2. RAMALINA POLLINARIA, *Ach.* Thallus membranaceous, erect or ascendant, irregularly lacerato-laciniated, flaccid, sublacunose, sorediiferous, greenish-grey; laciniæ short, often remarkably dilated, the margins entire or lacerated. Apothecia subterminal, slightly elevated; disc concave, pale buff-coloured, surrounded by an incurved thallodal margin; asci clavate 6-8 spored; spores linear-oblong, straight, or rarely curved, bilocular, subhyaline, or hyaline; ·0025 to ·003 in. long, by ·001 in. broad.

Lichen pollinarius, Ach. Prod.—Sm. E. Bot. 1607.—*Ramalina pollinaria,* Ach. Syn. 298.—Fries L. Ref. 31.—Hook. Brit. Fl. 2. 225.—Tayl. Fl. Hib. pt. 2. 85.—Schær. Enum. 8, L. H. 393!—Leight. Exs. 41!—Kbr. S. L. G. 40.—Nyl. Enum. Gen. 100.

On the trunks of old trees, hawthorn stumps, posts, rails, &c.; common in the south of England; less frequent, and generally not so well developed, in the north. It is uncertain whether it be a distinct species or not; extreme forms and well-grown specimens are readily recognised, but stunted and ill-developed ones, are often difficult to distinguish from young states of the preceding species.

3. RAMALINA SCOPULORUM, (*Retz.*) Thallus cæspitose, coriaceo-cartilaginous, pendent, irregularly branched and laciniated, rigid, sublacunose, somewhat polished, greenish-white; segments roundly compressed, linear, attenuated. Apothecia submarginal, pedicellate; disc plane, or convex, pale brown, becoming bluish-black when old, the margin reflexed; asci clavate 6-8 spored; spores linear-oblong, straight or curved, bilocular, hyaline or subhyaline; ·003 in. long, by ·001 in. broad.

Lichen scopulorum, Retz. Prodr. ed. 2. 282.—Sm. E. Bot. 688.—*Ramalina scopulorum,* Ach. Syn. 297.—Fries L. Ref. 32.—Hook. Brit. Fl. 2. 225.—Tayl. Fl. Hib. pt. 2. 85.—Schær. Enum. 9, L. H. 554!—Leight. Exs. 2!—Nyl. Enum. Gen. 99.

On maritime rocks. South Stacks, Holyhead, Anglesea! ex herb. *Rev. W. A. Leighton.* Ardglass! Co. Down, Ireland, *Dr. Maingay.* St. Breland's Bay! Jersey, *Mr. W. Stevens.*

β. POLYMORPHA, (*Ach.*) Thallus cæspitose, coriaceo-cartilaginous, irregularly laciniated, pendent, rigid, roundly-compressed, longitudinally costato-rugose, glaucous, or greenish-white, often sorediiferous; soredia capituliform. Apothecia submarginal and terminal, pedicellate; disc from concave becoming plane or convex, pale flesh or buff-coloured, subpruinose; margin erect or reflexed; asci clavate 6-8 spored; spores linear-oblong, straight or curved; bilocular, hyaline; ·003 in. long, by 001 in. broad. Spermogones verrucæform, very abundant, solitary or confluent, concolorous with the thallus; sterigmata short, simple, or at times somewhat divided at the base; spermatia short, oblong or ellipsoid, ·001 in. long, by ·00025 to ·0005 in. broad.

Ramalina polymorpha, Ach. Syn. 295.—Fries L. Ref. 32.—Hook. Brit. Fl. 2. 224.—Tayl. Fl. Hib. pt. 2. 84.—Leight. Exs. 73!—Nyl.

Enum. Gen. 99.—*R. tinctoria,* Schær. Enum. 8, L. H. 394 !—Kbr. S. L. G. 40.

On rocks and stones in alpine and subalpine districts. Eglestone ! Durham, *Rev. J. Harriman.* Whitsuncliff ! near Thirsk, Yorkshire, *I. G. Baker, Esq.* Ireland ! *A. G. More, Esq.* Highcliff ! and on the top of Roseberry ! Cleveland, Yorkshire. I see no good characteristic distinction between the present form and *R. scopulorum.* The deformed and rugose appearance of *R. polymorpha* is principally due to the presence of the spermogonal verrucæ, which are unusually abundant. The difference in their localities is here inadmissable as a specific character, as deformed states of what is generally considered as *R. scopulorum* are equally as common on the sea coast, as those of *R. polymorpha* are in alpine, or more inland districts. I regard them as states of one species, dependant for the aspects which they assume on local circumstances, or on the presence or absence of spermogones.

SUBTRIBE 3. ROCCELLEÆ.

Thallus subfruticulose, at first erect, afterwards pendulous, branched and laciniated, branches rounded, or compressed, concolorous on both sides ; medullary stratum, soft. Hypothallus none. Apothecia scutelliform; disc bluish-black, cæsio-pruinose, margined by a thallodal exciple.

GENUS 5. ROCCELLA, (*D.C.*)

Apothecia scutelliform, margined by a thallodal exciple ; thalamium arising from a brownish-black carbonaceous, simple hypothecium, which is placed upon the medullary stratum ; asci clavate, each containing 8 spores ; spores clavato-fusiform, or obtusely fusiform, straight or curved, quadrilocular, uncoloured. Thallus subfruticulose, at first erect, afterwards pendulous ; branches round, roundly-compressed, or compressed, equal or nodulose, of one colour on both sides.

1. ROCCELLA TINCTORIA, *Ach.* Thallus coriaceous, subfruticulose, erect, becoming pendent, glaucous ; branches round, simple, furcate, or bifurcate, equal or nodulose, often sorediiferous. Apothecia lateral, scattered, subinnate ; disc plane, becoming convex, blackish, cæsio-pruinose ; margin at first a little prominent, afterwards evanescent ; asci clavate, 6-8 spored ; spores obtusely- or clavato- fusiform, straight or curved, quadrilocular, subhyaline or hyaline ; ·005 in. long, by ·001 in. broad. Spermogones very minute, punctiform, black ; sterigmata linear, simple above, divided at the base ; spermatia cylindrico-arcuate, ·0025 to ·003 in. long, by ·00015 in. broad.

Roccella tinctoria, Ach. L. Univ. 439.—Fries L. Ref. 33.—Hook. Brit. Fl. 2. 221.—Schær. Enum. 7.—Nyl Enum. Gen. 97.—*Lichen Roccella,* L.—Sm. E. Bot. 211.

β. PHYCOPSIS, (*Ach.*) Thallus coriaceous, subfruticulose, erect, or pendent, glaucous ; branches roundly compressed and somewhat angular, simple, or dichotomously divided, naked, or sorediiferous ; soredia often confluent and agglomerated, pale bluish-white. Apothecia as above.

Rocella phycopsis, Ach. L. Univ. 440.—Schær. Enum. 7.—Nyl. Enum. Gen. 97.—Hepp. Eur. 357 !

On maritime rocks. α. Lynmouth Tors! *Miss M. Atwood.* St. Owen's Bay, Jersey! *Mr. W. Stevens.* Guernsey! *G. Gosselin, Esq.* β. Bembridge! Isle of Wight, *A. G. More, Esq.* This variety only differs from the ordinary form of *tinctoria,* by its thallus being roundly-compressed and more divided. But specimens possessing characters directly intermediate are of very frequent occurrence, and the two forms are not at all times separable.

2. ROCCELLA FUCIFORMIS, (*L.*) Thallus cartilagineo-coriaceous, dichotomously laciniated, pendent, compressed, glaucous; laciniæ linear, attenuated, often sorediiferous. Apothecia marginal, sessile; disc plane, bluish-black, cæsio-pruinose; margin thin, subpersistent; asci clavate 8 spored; spores obtusely- or clavato-fusiform, straight or curved, quadrilocular, subhyaline or hyaline; ·005 to ·006 in. long, by ·001 in. broad. Spermogones, &c., as in the preceding, or with a very slight variation. PLATE 1, *fig.* 18.

Lichen fuciformis, L.—Sm. E. Bot. 728.—*Roccella fuciformis,* D.C. —Ach. Syn. 244.—Fries L. Ref. 33.—Hook. Brit. Fl. 2. 222.—Schær. Enum. 7, L. H. 553!—Leight. Exs. 171!—Nyl. Enum. Gen. 97.

On maritime rocks. St. Breland's Bay! Jersey, *Mr. W. Stevens,* Guernsey! *G. Gosselin, Esq.*

SUBTRIBE 4. CETRARIEÆ.

Thallus fruticulose, canaliculato-foliaceous, or foliaceous, suberect or ascendant, cartilaginous or membranaceous, branched or laciniated, rounded, or compressed and dilated, concolorous on both sides, or discoloured. Hypothallus none. Apothecia peltæform, or scutellato-peltate, affixed obliquely to the apices of the thallus, margined by a thallodal exciple.

GENUS 6. CORNICULARIA, (*Ach.*)

Apothecia peltæform, affixed obliquely to the apices of the thallus, margined by a thallodal exciple, which is either denticulated or entire; thalamium thin, arising from a simple hypothecium, which is placed upon the medullary stratum; asci oblong or cuneate, each containing 8 spores; spores elliptical or ovate, unilocular, uncoloured. Thallus fruticulose, or canaliculato-foliaceous, cartilaginous, erect or ascendant, branched or laciniated; branches rounded, or compressed and dilated, of one colour on both sides.

1. CORNICULARIA TRISTIS, (*Weber.*) Thallus corneo-cartilaginous, fruticulose, roundly compressed, dichotomously branched, rigid, solid, pitch-black, or brownish-black; branches rounded, fastigiate. Apothecia terminal; disc plano-convex, of nearly the same colour as the thallus; margin entire, or fimbriated; asci oblong, 8 spored; spores ovate or subglobose, unilocular, hyaline or subhyaline; ·0015 to ·00175 in. long, by ·001 to ·00075 in. broad.

Lichen tristis, Weber.—Sm. E. Bot. 720.—*Cetraria tristis,* Fries L. Ref. 34.—*Cornicularia tristis,* Ach. Syn. 69.—Hook. Brit. Fl. 2. 228.— Tayl. Fl. Hib. pt. 2. 86.—Kbr. Sys. 7.—*Parmelia fahlunensis,* γ. *tristis,* Schær. Enum. 48, L. H. 256!—*Parmelia tristis,* Nyl. Enum. Gen. 105.

On rocks in alpine and subalpine districts. Eglestone! Durham, *Rev. J. Harriman.* Aberfeldy! Perthshire, *H. Macmillan, Esq.* Glen Dee! Morchone! and other parts of Braemar, *Mr. A. Croall.* Near Perth! *Dr. Lindsay.*

2. CORNICULARIA ACULEATA, (*Ehrh.*) Thallus cartilaginous, fruticulose, rigid, very much and irregularly branched, rounded or slightly compressed, dark brown, or chestnut coloured; branches divaricated, flexuose, the ultimate ones small, black, spinulose. Apothecia terminal, peltate; disc bright-bay, glossy, surrounded by a denticulato-fimbriated margin; asci short, narrow-clavate, 6-8 spored; spores elliptical-oblong, unilocular, hyaline; ·00175 to ·002 in. long, by ·00075 to ·001 in. broad.

Lichen aculeatus, Ehrh.—*Lichen hispidus,* Sm. E. Bot. 452.—*Cornicularia aculeata,* Ach. Syn. 299.—Hook. Brit. Fl. 2. 228.—Tayl. Fl. Hib. pt. 2. 86.—Kbr. S. L. G. 8.—*Cetraria aculeata,* Fries L. Ref. 35. —Schær. Enum. 16, L. H. 254! et 255!—Leight. Exs. 3! et 4!—Nyl. Enum. Gen. 100.

β. COELOCAULA, (*Fw.*) Thallus diffuse, much branched, lacunose, bright-bay or dark-brown; branches strong, lax, flexuose, roundly-compressed, or compressed, the ultimate ones bifurcate, spinulose. Apothecia as above.

Cornicularia aculeata, β. coelocaula, Fw. Kbr. S. L. G. 8.—*Cetraria aculeata, var. campestris,* Auct.

On the earth on dry heaths and moors, rocks, old walls, etc., common; *β.* less frequent. High green wood, Todmorden! *H. Baines, Esq.* Shipley Common! *S. Hailstone, Esq.* Flazendale! *I. G. Baker, Esq.* Malham! *Dr. Carrington.* Ayton Moor! Burton Head! and other places in Cleveland, Yorkshire. The spermogones are not of unfrequent occurrence, but they are very difficult to recognise, even with the aid of a good lens, on account of their minuteness, and of being of the same colour as the thallus. They are usually seated on the tips of the spinules, which terminate the ultimate branches of the thallus, very minute, tuberculiform, dark-brown or nearly black. The sterigmata are very short, and for the most part undefinable, further than a mass of grey tissue. The spermatia are very fine and delicate, but never very abundant, short cylindrical, ·00075 in. long by ·00012 in. broad.

3. CORNICULARIA ISLANDICA, (*L.*) Thallus cartilaginous, subfoliaceous, dichotomously laciniated, canaliculated, erect or ascending, olive-brown, laciniæ sublinear, their margins dentato-ciliated; fertile laciniæ rather broader and more dilated. Apothecia obliquely scutellate, adnate to the superior face of the extremities of the laciniæ, appressed; disc dark chestnut, plane, becoming undulated when old; margin entire; asci cuneate, 6-8 spored; spores elliptical, or ovate, unilocular, hyaline; ·002 to ·0025 in. long, by ·001 in. broad. PLATE 1, *fig.* 19.

Lichen Islandicus, L.—Sm. E. Bot. 1330.—*Cetraria islandica,* Ach. Syn. 229.—Fries L. Ref. 36.—Hook. Brit. Fl. 2. 221.—Tayl. Fl. Hib. pt. 2. 155.—Schær. Enum. 15, L. H. 22!—Leight. Exs. 42!—Hepp. Eur. 169!—Kbr. S. L. G. 44.—Nyl. Enum. Gen. 100.

β. CRISPA, (*Ach.*) Thallus much smaller, crisped; laciniæ linear, very narrow, their margins connivent, dentato-ciliated.

Ach. L. Univ. 513.— Fries L. Ref. 37.—Schær. Enum. 16, L. H. 23! —Hepp. Eur. 170!—Kbr. S. L. G. 44.

On the ground in subalpine woods, and on heaths. Clova! *Mr. W. Gardiner.* Morchone! Braemar, *Mr. A. Croall.* Ben Macdhui, Braemar, Flazendale! and on Seamer Moor, near Scarbro'! Yorkshire, *I. G. Baker, Esq.* β.—Ben Lawers! *Dr. Lindsay.* Widdy-bank! Teesdale, Durham. The spermogones are of common occurrence both in the normal form, and in the variety, and may be recognised without much difficulty by the aid of an ordinary lens. They are seated on the tips of the marginal cilia, and their presence is usually indicated by the cilia being shorter, rather stouter, and of a deeper brown colour, than those not bearing spermogones. The sterigmata are very short, consisting of a few articulations, but they are frequently scarcely definable. The spermatia are short, cylindrical, ·00116 in. long, by ·00012 in. broad.

GENUS 7. CETRARIA, (*Ach.*)

Apothecia scutellato-peltate, affixed obliquely to the apices of the laciniæ, margined by a thallodal exciple; thalamium thin, gelatinous when moist, arising from a simple hypothecium, which is placed upon the medullary stratum; asci cuneate, or subventricose, each containing 8 spores; spores elliptical, oblong, or subglobose, unilocular, uncoloured. Thallus cartilaginous, or membranaceous, foliaceo-lobed; lobes ascending, or depressed, of one colour on both sides, or discoloured.

§. 1.—*Thallus membranaceo-cartilaginous, suberect.*

1. CETRARIA CUCULLATA, (*Bellard.*) Thallus cartilaginous, subfoliaceous, sinuato-laciniated, straw-coloured; laciniæ erect or ascending, their margins naked, connivent and undulated. Apothecia of a medium size or rather large, adnate on the under side of the extremities of the laciniæ; disc somewhat concave, pale brown, surrounded by an inflexed thallodal margin; asci cuneate, scarcely perceptible, 8 spored (?); spores ovate, or oblong, unilocular, hyaline; ·0015 to ·002 in. long, by ·00075 in. broad.

Lichen cucullatus, Bellard.—*Cetraria cucullata,* Ach L. Univ. 511. Fries L. Ref. 37.—Schær. Enum. 14, L. H. 18!—Kbr. S. L. G. 45.—*Platysma cucullatum,* Nyl. Enum. Gen. 100.

On the ground in alpine districts. Cairngorm Mountains! Scotland, in herb, *Rev. J Dalton.* The present species is admitted to rank as British, solely on the authority of the above specimens. DR. LINDSAY, in his Memoir on the spermogones of the foliaceous Lichens, page 178, remarks on a specimen of *C. nivalis,* from Lochnagar, collected by PROFESSOR DICKIE, that it "closely resembles *P. cucullatum,* and is apparently a transition form." In the same work at page 179, when commenting on *P. cucullatum,* he (DR. LINDSAY) says—"On the Norwegian mountains, I almost always found these two species growing in the same tuft. Indeed they would appear to graduate into each other." From these facts, the reader will note the degree of likelihood of its occurrence in Scotland.

2. CETRARIA NIVALIS, (*L.*) Thallus subcartilaginous, subfoliaceous,

lacero-laciniated, nearly erect, reticulato-lacunose, pale sulphur-coloured, orange at the base; laciniæ canaliculato-patulous, their margins crenato-dentated and crisped. Apothecia large, terminal; disc at first concave, afterwards plane, yellowish flesh-coloured, surrounded by a thin crenulated margin; asci inconspicuous; spores ovate, or oblong, unilocular, hyaline; ·0015 to ·002 in. long by ·00075 in. broad.

Lichen nivalis, L.—Sm. E. Bot. 1994.—*Cetraria nivalis*, Ach. Syn. 228.—Fries L. Ref. 38.—Hook. Brit. Fl. 2. 221.—Schær. Enum. 13. L. H. 19!—Leight. Exs. 43!—Kbr. S. L. G. 45.—*Platysma nivale*, Nyl. Enum. Gen. 100.

On the ground, in alpine districts. Clova! *Mr. W. Gardiner.* Source of the Dee! Lochnagar! and summit of Morchone! *Dr. Lindsay.* Ben Macdhui! *I. G. Baker, Esq.* The spermogones of the present species are not of uncommon occurrence. They are attached to the crisped margins of the laciniæ, and usually present themselves as minute, round, prominent, brownish-black verrucæ. The sterigmata are irregularly articulated. The spermatia are straight, cylindrical, about ·001 in. long, by ·00012 in. broad.

3. CETRARIA JUNIPERINA, *(L.)* Thallus membranaceo-foliaceous, suberect, lacero-laciniated, lacunose, bright yellow on both sides; laciniæ rather short, concave, crisped. Apothecia adnate to the superior face of the extremities of the laciniæ; disc bright-bay, or chestnut-coloured, surrounded by a thin crenated thallodal margin; asci subventricose, 8 spored; spores elliptical, or subglobose, unilocular, hyaline; ·0015 in. long, by ·00075 to ·001 in. broad.

Lichen juniperinus, L.—*Cetraria juniperina*, Ach. Lich. Univ. 506.—Fries L. Ref. 40.—Hook. Brit. Fl. 2. 220.—Kbr. S. L. G. 47.—*C. juniperina, α. terrestris*, Schær. Enum. 13, L. H. 20!—*Platysma juniperinum*, Nyl. Enum. Gen. 100.

β. PINASTRI, (*Scop.*) Thallus membranaceo-foliaceous, depressed, roundly-lobed, greenish-yellow; laciniæ plane, the margins crisped and powdery, deep yellow. "Apothecia marginal; disc yellowish-brown; margin obtuse."

Lichen pinastri, Scop.—Sm. E. Bot. 2111.—*Cetraria pinastri*, Fries L. Ref. 40.—Kbr. S. L. G. 48.—*C. juniperina, β. pinastri*, Hook. Brit. Fl. 2. 220.—Schær. Enum. 20, L. H. 21!—*Platysma juniperinum, β.* Nyl. Enum. Gen. 100.

On the earth, and on trees in mountainous woods, &c. *α.* Clova! Scotland, *Mr. R. Jacob.* *β.* Teesdale! Durham, *Rev. J. Harriman;* Clougha! Lancashire, *Mr. R. Jacob.* The apothecia of both forms are very rarely met with. The present description of them is from a Pyrenees specimen. The spermogones are not of unfrequent occurrence, especially in *juniperina.* They bear a general resemblance to those of *C. nivalis*, both as regards their external appearance, and situation, and internal contents, with the exception of their spermatia, which at times appear as if they were a little more thickened at one end than in the other; they are also rather more elongated, being on an average ·00125 in. long.

§. 2. *Thallus membranaceous, subdepressed.*

4. CETRARIA GLAUCA, (*L.*) Thallus membranaceous, foliaceous, ex-

panding gradually on every side, sinuated and lobed, glaucous-grey above, brownish or brownish-black beneath; laciniæ ascendant, the margins curled and lacerated. Apothecia peltate, adnate on the terminal margin of the laciniæ, disc reddish-brown or chestnut, surrounded by a thin, crenulated margin; asci short, cuneate, 8 spored; spores minute, elliptical, unilocular, hyaline; ·00175 in. long, by ·001 in. broad. PLATE 1, *fig.* 20.

Lichen glaucus, L.—Sm. E. Bot. 1606.—*Cetraria glauca*, Ach. Syn. 227.—Fries L. Ref. 38.—Hook. Brit. Fl. 2. 220.—Tayl. Fl. Hib. pt. 2. 154.—Schær. Enum. 12, L. H. 252!—Leight. Exs. 44!—Kbr. S. L. G. 46.—*Platysma glaucum*, Nyl. Enum. Gen. 100, L. P. 28!

β. FALLAX, (*Weber.*) Thallus foliaceous expanded, sinuato-lobed, smooth, glaucous-green above, white, or brownish-white beneath; lobes more or less elongated and dilated, ascending, their margins crisped, and often isidiiferous. Apothecia and spores as above.

Lichen fallax, Weber.—Sm. E. Bot. 2373.—*Cetraria fallax*, Ach. Meth. 206.—Kbr. S. L. G. 47.—*C. glauca*, Fries L. Ref. 38, in pt.—*C. glauca*, β. Hook. Brit. Fl. 2. 220.—Schær. Enum. 13, L. H. 253!

On the ground, on trees, rocks, etc.; common in subalpine districts. Apothecia rarely met with; Tynron Down! *W. Stevens, Esq.* The variety *fallax*, is much more sparingly distributed than the ordinary form; it occurs in great abundance on pine trees, in Ingleby Park! Cleveland, Yorkshire.

5. CETRARIA SEPINCOLA, (*Ehrh.*) Thallus membranaceous, foliaceous, sinuato-laciniated, from olive becoming olive-brown above, paler beneath; laciniæ ascendant, plane, or crisped and curled, their margins often pulverulent. Apothecia adnate, or placed near the upper margins of the superior face of the laciniæ; disc from concave becoming plane, dark-brown or chestnut-coloured, surrounded by a thin crenated margin; asci subventricose, 8 spored; spores minute, oblong, unilocular, hyaline; ·00175 in. long, by ·001 in. broad.

Lichen sepincola, Ehrh.—Sm. E. Bot. 2386.—*Cetraria sepincola*, Ach. Syn. 227.—Fries L. Ref. 39.—Hook. Brit. Fl. 2. 220.—Schær. Enum. 14, L. H. 297!—Leight. Exs. 45!—Kbr. S. L. G. 47.—*Platysma sepincolum*, Nyl. Enum. Gen. 101.

On trees, in mountainous districts, generally firs or birch. Blaeberry Hill! Perth, *Dr. Lindsay.* Deerhill Wood! *Mr. W. Gardiner.* Ingleby Park! Baysdale! Kildale! and High-cliff! all in Cleveland, Yorkshire.

TRIBE 3. PELTIDEACEÆ. (*Fw.*)

Thallus frondose, coriaceous, or papyraceo-membranaceous. Hypothallus rhizineform, villose, or venose, adnate to the under side of the thallus. Apothecia reniform, or peltæform, adnate to the under surface of the lobes, the upper surface, or to the disc of the thallus, margined by a thallodal exciple; epithecium naked, or velate.

GENUS 1. NEPHROMA, (*Ach.*)

Apothecia reniform, adnate to the under surface of the lobes or proper portions of the thallus, margined by a thallodal exciple;

thalamium arising from a simple hypothecium, which is placed upon the medullary stratum; asci clavate, each containing 8 spores; spores obtusely-fusiform, straight or slightly curved, quadrilocular, pale yellowish-brown. Thallus coriaceo-membranaceous, foliaceous; under side pale, naked or somewhat villose.

1. NEPHROMA LÆVIGATUM, *Ach.* Thallus suborbicular, coriaceo-membranaceous, sinuato-lobed, imbricated, smooth, olive-green when wet and growing, brown when dry; under side naked, lacunose, pale brown; fertile lobes short, erect. Apothecia reniform, rather large, adnate to the under side of the lobes; disc plane, reddish-brown, surrounded by a thin, irregularly crenated thallodal margin; asci clavate, 8 spored; spores obtusely-fusiform, often slightly curved, quadrilocular, pale yellowish-brown; ·004 to ·0045 in. long, by ·00125 in. broad. PLATE 1. *fig.* 21.

Nephroma lævigatum, Ach. Syn. 242.—Kbr. S. L. G. 55.—*Lichen resupinatus*, Sm. E. Bot. 305.—*Peltigera resupinata*, c. Fries L. Ref. 42.—*Nephroma resupinata*, Hook. Brit. Fl. 2. 216.—Tayl. Fl. Hib. pt. 2. 154.—Leight. Exs. 107!—*Neph. resupinatum*, β. Schær. Enum. 18.—*Nephromium lævigatum*, Nyl. Enum. Gen. 101.—*Nephroma resupin.* β. *lævigatum*, Hepp. Eur. 363!

Guernsey
Serk
Jersey.

β. PARILE, (*Ach.*) Thallus subcoriaceous, sinuato-lobed, from olive-green, becoming dark-brown; under side naked, rugulose, brown; lobes crenate, the margins crisped and sorediiferous. Apothecia as above.

Lichen parilis, Ach. Prod. 164.—Sm. E. Bot. 2360.—*Nephroma parilis*, Ach. Syn. 242.—Hook. Brit. Fl. 2. 216.—*Nephroma resupin.* β. *lævigatum, b. sorediatum*, Schær. Enum. 18.—Hepp. Eur. 364!—*Nephroma lævigatum, var. parile*, Nyl. L. P. 109!

On the trunks of trees, and on mossy rocks in shady places, in subalpine and alpine districts. Ravine at the foot of Glenesk! and at the Fall of Foyers, Caledonian Canal! *Dr. Lindsay.* Hilks Wood! Ingleborough, *Dr. Carrington.* Near Exeter! Devonshire, *Mr. E. Parfitt.* Dunkeld, *I. G. Baker, Esq.* Oggeray Gill! Stogdale! Baysdale! and Ingleby Park! all in Cleveland, Yorkshire.—β. Rocks, Dolgelly! *Mr. Ralfs.* Near Glenoren! Co. Antrim, *D. Moore, Esq.*

GENUS 2. PELTIGERA, (*Willd.*)

Apothecia suborbicular, peltæform, adnate to the upper surface of ascending thallodal lobules, margined by a thallodal exciple; thalamium arising from a simple hypothecium, which is placed upon the medullary stratum; asci clavate, or elongato-clavate, each containing 6-8 spores; spores acicular, fusiform, or clavato-fusiform, straight or variously flexuose, quadrilocular, or from quadrilocular becoming 6-8-10-locular, uncoloured. Thallus frondose, coriaceous, or membranaceous, variously lobed; under side venose.

1. PELTIGERA APHTHOSA, (*L.*) Thallus coriaceous, expanding from a centre, roundly lobed; lobes broad, upper surface light-green, sprinkled with brown verrucæ; under surface densely brown- or black-fibrillose, and slightly venose. Apothecia adnate on oblong, ascending, narrow lobes of the thallus; disc from concave becoming plane, bright

chestnut-colour, surrounded by an inflexed, somewhat lacerated thallodal margin; asci clavate, 8 spored; spores acicular, or elongato-fusiform, straight, curved, or a little flexuose, normally quadrilocular, subhyaline; ·009 to ·012 in. long, by ·00075 in. broad.

Lichen aphthosus, L.—Sm. E. Bot. 1119.—*Peltidea aphthosa*, Ach. Syn. 238.—Hook. Brit. Fl. 2. 215.—Tayl. Fl. Hib. pt. 2. 153.—*Peltigera aphthosa*, Hoffm.—Fries. L. Ref. 44.— Schær. Enum. 19, L. H. 29!—Hepp. Eur. 173!—Kbr. S. L. G. 58.—Nyl. Enum. Gen. 101.

On moist shady rocks among moss, &c., in alpine districts. Barmouth! North Wales, *Rev. T. Salwey*. Near Eglestone! Durham, *Rev. J. Harriman*. Near Exeter! Devonshire, *Mr. E. Parfitt*. Penhill, *I. G. Baker, Esq.* Wensleydale! *Mr. J. W. Watson*. White Force, on the Yorkshire side of the River Tees, Teesdale, Durham. Readily known when growing by the bright grass-green colour of its thallus, and when gathered and dry, by the irregularly formed brown verrucæ, which are scattered without order over its upper surface.

2. Peltigera canina, (L.) Thallus coriacio-membranaceous, expanding in an irregular manner, roundly lobed, subscrobiculate, finely tomentose, grey, or brownish-green; under side white or pale brown, reticulato-venose, and fibrillose. Apothecia adnate on short and rather broad marginal lobes, rounded, at length semirevolute; disc reddish-brown or chestnut-coloured, surrounded by a thin subcrenulated margin; asci clavate, 8 spored; spores elongato-fusiform, or clavato-fusiform, straight, curved, or flexuose, 4-6-8-10-locular, subhyaline; ·009 to ·012 in. long, by ·00075 in. broad. Plate I, *fig.* 22.

Guernsey
Sark
Jersey.

Lichen caninus, L.—Sm. E. Bot. 2299.—*Peltidea canina*, Ach. Syn. 239.—Hook. Brit. Fl. 2. 215.—Tayl. Fl. Hib. pt. 2. 153.—*Peltigera canina*, Hoffm.—Fries L. Ref. 45.—Schær. Enum. 20. L. H. 28!—Leight. Exs. 141!—Kbr. S. L. G. 58.—Nyl. Enum. Gen. 101.

On the ground, on heaths, hedge-banks, and about the roots of trees, generally among moss or short grass; common. The great similarity of the chief characters, of the four following forms to the present species, and the frequent occurrence of intermediate forms, I think, clearly warrant their annexation to it.

β. rufescens, (*Hoffm.*) Thallus coriaceous, roundly lobed, subtomentose, greenish, or greyish-brown when growing, reddish-brown when dry; lobes short, concave, their margins more or less inflexed, undulated, crisped, and clothed with isidioid excrescences, or very small crenulated squamules; under side pale-fibrillose, and reticulated with dark-brown veins. Apothecia rounded, becoming oblong, and eventually revolute; disc dark reddish-brown, surrounded by a thin, pale, thallodal margin; spores acicular, or elongato-fusiform, 4 to 10-locular, subhyaline; ·01 to ·013 in. long, by ·00075 in broad.

Peltigera rufescens, Hoffm.—Fries L. Ref. 46.—Schær. Enum. 21.—Kbr. S. L. G. 59.—Nyl. Enum. Gen. 101.—*Peltidea rufescens*, Hook. Brit. Fl. 2. 216.—*Lichen rufescens*, Sm. E. Bot. 2300.

On hedge-banks, mossy rocks, &c.; not uncommon. The present form differs from the preceding, principally by its thallus being rather thicker and of a darker colour, by its shorter and smaller lobes, and by their margins being usually inflexed, and clothed to a greater or less extent, with isidioid excrescences or very minute squamules.

γ. LIMBATA, *(Delise.)* Lobes of the thallus concave, their margins more or less undulated, crisped, and clothed with isidioid excrescences which eventually become pulverulent. Otherwise as above.

Peltigera limbata, Delise.—Hepp. Eur. 366!—*Peltigera canina*, b. *sorediata*, Schær. Enum. 20.—*Peltigera canina*, var. Leight. Exs. 262!

On the mossy trunks of trees, old stumps, &c., but not common. Near Dolgelly, North Wales! *Rev. W. A. Leighton.* Sowerdale! Cleveland. Yorkshire.

δ. SCUTATA, (*Dicks.*) Thallus subpapyraceous, spreading, sinuato-lobed, pale greenish-ash colour; lobes small, subascending, their margins undulated, crisped, and grey-sorediiferous; under side pale brown or cream-coloured, tinged at times with pink, reticulated with dark-veins, and sparingly fibrous. Apothecia suborbicular, adnate on short ascending lobes; disc dark-brown, surrounded by a thin, inflexed, thallodal margin; asci 6-8-spored; spores acicular, or elongato-fusiform, mostly quadrilocular, subhyaline; ·007 to ·01 in. long, by ·00075 in. broad.

Lichen scutatus, Dicks. Crypt. fasc. 3. 18. (excl. the syn.)—Sm. E. Bot. 1834.—*Peltidea scutata*, Ach. Syn. 237.—Hook. Brit. Fl. 2. 215. —*Peltigera polydactyla*, b. *scutata*, Fries L. Ref. 47.—Schær. Enum. 21.—*P. scutata*, Kbr. S. L. G. 60.

On the trunks of old trees among moss. Near Exeter! Devonshire, *Mr. E. Parfitt.* Hoggarts' Wood! Ingleby, Cleveland, Yorkshire. In comparison with the preceding forms, the present one may be said to be well characterised. Its constantly small sinuato-lobed thallus, and bluish or grey-sorediiferous margins, always renders it easy of identification,—γ. *limbata*, is a much larger plant, the margins of the lobes of its thallus are also generally isidiiferous at first, in fact it is more allied to *rufescens*, than to *scutata*.

ε. PUSILLA, (*Dill.*) Thallus subcoriaceous, digitato-lobed; lobes minute, nearly all fertile, ascending, very finely tomentose, smooth, greenish-ash colour; under side greyish-white or cream-colour, reticulato-venose, and subfibrillose. Apothecia adnate on ascendant narrow marginal lobes, rounded, at length oblongo-revolute; disc dark reddish-brown, surrounded by a very thin crenated margin; spores acicular, curved or flexuose, 4-6-8-10 locular, subhyaline; ·008 to ·01 in. long, by ·0005 in. broad.

Peltigera canina, b. pusilla, Dill.—Fries L. Ref. 45.—*Lichen spurius*, Ach. Prod.—Sm. E. Bot. 1542.—*Peltidea spurea*, Hook. Brit. Fl. 2. 215.—*Peltigera canina*, γ. *spurea*, Schær. Enum. 21.—*Peltigera pusilla*, Kbr. S. L. G. 59.

On old stumps, mossy rocks, &c., but not common. Hoggart's Wood! Ingleby, Cleveland, Yorkshire. This is a remarkably elegant variety, and without due care, it may be easily confused with dwarf states of *P. polydactyla*. Its principal distinguishing features are, its general resemblance to *P. canina*, place of growth, diminutive thallus and apothecia, its few and short fibres, and reticulated cream-coloured veins on the under side of its thallus, and its short and slender spores.

3. PELTIGERA POLYDACTYLA, *(Neck.)* Thallus papyraceous, sinuato-lobed, smooth, glabrous, shining, glaucous-green when moist, greyish-brown when dry; lobes numerous, rather short, suberect, or ascendant;

under side nearly naked, reticulated with brown spongy-veins. Apothecia very numerous, adnate on short suberect lobes, rounded, at length oblongo-revolute; disc dark-brown, surrounded by a thin pale thallodal margin; asci clavate 6-8 spored; spores acicular, or elongato-fusiform, straight, curved, or flexuose, from quadrilocular becoming 6-8 locular, hyaline or subhyaline; ·012 to ·015 in. long, by ·00075 in. broad.

Lichen polydactylus, Necker.—*Peltigera polydactyla*, Hoffm.—Fries L. Ref. 46.—Schær. Enum. 21, L. H. 30!—Leight. Exs. 172!—Kbr. S. L. G. 61.—Nyl. Enum. Gen. 101.—*Peltidea polydactyla*, Hook. Brit. Fl. 2. 216.

On the ground, among moss, short grass, etc.; common in rather damp or shady situations, in mountainous districts. From the general appearance, and constancy of the characters of the present species, its separation seems to me both natural and justifiable. Transition states, or forms possessing characters, intermediate between the present species and *P. cania*, are rarely met with. If its numerously lobed thallus, its smooth and glabrous upper surface, and its nearly or quite naked under surface, and spongy veins, together with its abundant apothecia, be regarded, no difficulty need be felt in distinguishing it.

4. Peltigera horizontalis, (*L.*) Thallus coriaceous, variously lobed, crenate, glabrous, and somewhat shining, glaucous or greenish-brown; under side downy, covered nearly to the margin with reticulated dark-brown viens, the interstices oblong, cream-coloured; fibres tufted, sparingly scattered, blackish brown. Apothecia adnate on short lobes, horizontal, from orbicular becoming transversely oblong; disc plane reddish-brown, surrounded by a pale, subcrenulated, thallodal margin; asci elongated, 6-8 spored; spores fusiform, constantly quadrilocular, subhyaline, or hyaline; ·005 to ·006 in. long, by ·001 to ·00125 in. broad.

Lichen horizontalis, L.—Sm. E. Bot. 888.—*Peltidea horizontalis*, Ach. Syn. 238.—Hook. Brit. Fl. 2. 215.—*Peltigera horizontalis*, Hoffm. —Fries L. Ref. 47.—Schær. Enum. 21, L. H. 27!—Leight. Exs. 108! —Nyl. Enum. Gen. 101, L. P. 110!—Kbr. S. L. G. 61.

On moist shady rocks, and about the roots of trees, in subalpine districts. Studley Park! Yorkshire, *W. Brunton, Esq.* Aberfeldy Road, beyond Inver, Dunkeld! *Dr. Lindsay.* Flazendale! Yorkshire, *I. G. Baker, Esq.* Stogdale! Oggeray Gill! and Ingleby Park! Cleveland, Yorkshire. The character of the apothecia and spores, clearly distinguishes the present from all the preceding species and varieties.

5. Peltigera venosa, (*L.*) Thallus coriaceous, small, flabelliform, simple, or slightly lobed and undulated, smooth, of a fine green colour when recent, greenish-brown when dry; under side white, downy, variegated with prominent, longitudinal, dark-coloured branched veins. Apothecia adnate on the margin of the thallus, but more connected with the superior surface than the inferior, horizontal, suborbicular; disc plane, dark red-brown, surrounded by an even thallodal margin, which eventually disappears; asci ventricoso-saccate, 6-8 spored; spores obtusely fusiform, constantly quadrilocular, hyaline or subhyaline; ·005 to ·007 in. long, by ·001 to ·00125 in. broad. Plate 1, *fig.* 23.

Lichen venosus, L.—Sm. E. Bot. 887.—*Peltidea venosa*, Ach. Syn. 237.—Hook. Brit. Fl. 2. 215.—*Peltigera venosa*, Fries L. Ref. 48.—

Schær. Enum. 19, L. H. 26!—Hepp. Eur. 172!—Kbr. S. L. G. 62.—Nyl. Enum. Gen. 101.

On the ground in moist shady places, in alpine districts. Killin, Lock Tay! *Dr. Lindsay.* Pass of Killiecrankie! Perthshire, *Rev. J. Dalton.* Birks of Aberfeldy! *H. Macmillan, Esq.* Knockagh Hills! Co. Antrim, Ireland, *D. Moore, Esq.*

GENUS 3. SOLORINA, (*Ach.*)

Apothecia peltate, adnate to the disc of the thallus, depressed, subrotundo-maculæform, covered at first with a fugaceous thallodal veil, which at length forms an evanescent margin; thalamium subgelatinous when moist, arising from a simple hypothecium, which is placed upon the gonidiac stratum; asci elongato-subventricose, or elongated, 4 or 8 spored; spores oblong, or obtusely-fusiform, bilocular, coloured. Thallus coriaceo-membranaceous, submonophyllus, plaited, or lobed at the circumference; under side venose or lanuginose.

1. SOLORINA CROCEA, (*L.*) Thallus coriaceous, subcrispato-lobed, appressed, green when recent, becoming olive-brown when dry; under side villose, saffron or deep orange-coloured, subreticulato-venose. Apothecia slightly tumid; disc dark chestnut-coloured, immarginate; asci elongato-subventricose, 8 spored; spores obtusely-fusiform, bilocular, of a bright pale-red colour; ·007 to ·008 in. long, by ·002 in. broad.

Lichen croceus, L.—Sm. E. Bot. 498.—*Solorina crocea,* Ach. Syn. 8.—Hook. Brit. Fl. 2. 214.—Schær. Enum. 22, L. H. 24!—Kbr. S. L. G. 63.—Nyl. Enum. Gen. 101.—*Peltigera crocea,* Fries L. Ref. 48.

On the ground in sandy places, in alpine districts. Ben Lawers! *Dr. Lindsay.*

2. SOLORINA SACCATA, (*L.*) Thallus membranaceo-papyraceous, expanding from a centre, smooth, the margins lobed and somewhat imbricated, of a bright grass-green colour when recent, greyish-brown when dry; under side whitish and fibrillose. Apothecia at first applanate, afterwards saccato-depressed; disc brownish-black, immarginate; asci elongated, 4 spored; spores oblong, at times a little constricted in the middle, bilocular, dark-red; ·008 in. long, by ·0035 in. broad. PLATE 1, *fig.* 24.

Lichen saccatus, L.—Sm. E. Bot. 288.—*Solorina saccata,* Ach. Syn. 8.—Hook. Brit. Fl. 2. 214.—Schær. Enum. 22, L. H. 25!—Leight. Exs. 111! Hepp. Eur. 171!—Kbr. S. L. G. 63.—Nyl. Enum. Gen. 101.—*Peltigera saccata,* Fries L. Ref. 49.

On the ground, in moist shady situations among rocks, in alpine and subalpine districts. Studley Park! Yorkshire, *W. Brunton, Esq.* St. Vincent Rocks! Bristol, *Miss M. Atwood.* Ingleborough! *I. G. Baker, Esq.* Ben Lawers! *H. Macmillan, Esq.* Falcon Clints! and White Force! Teesdale, Durham.

3. SOLORINA LIMBATA, (*Sommf.*) Thallus subcoriaceous when dry, gelatinous when wet, squamulose, dark-green, becoming when dry greyish-brown; squamules suberect, small, minutely inciso-lobed and crenate, eventually forming a thickish granulated crust. Apothecia

large, irregularly scattered, urceolate; disc dark-chestnut or nearly black, surrounded externally by a thin, erect, greyish-green, thallodal margin; asci elongated, 4 spored; spores oblong, bilocular, dark-red; ·008. to ·009 in. long, by ·003 to ·0035 in. broad.

Lecanora limbata, Sommf. Fl. Lapp. 105. t. 3.—*Solorina saccata, β. limbata*, Schær Enum. 23.—Kbr. S. L. G. 63.—*Peltigera saccata*, Fries L. Ref. 49 in pt.—*Lichen spongiosus*, Sm. E. Bot. 1374.—*Collema spongiosa*, Hook. Brit. Fl. 2. 214.

On wet rocks, generally among mosses, or hepaticeæ. Teesdale! Durham, *Rev. J. Harriman.* Ingleborough! *Dr. Carrington.* Guisbro' Moor! Cleveland, Yorkshire. The present species is altogether an anomalous and suspicious one, and it is only after repeated examinations that I allow it a separate place. The thallus is very unlike that of either of the preceding species; it is gelatinous when wet, and consists of small ascending squamules, which are cut into numerous narrow segments, and are either scattered, loosely imbricated, or closely packed together, in which state it has a granulato-crustaceous appearance, and bears a strong resemblance to the thallus of a *Collema*, or a *Leptogium*. The apothecia are similar, both in their internal structure and in their external appearance to those of *L. saccata;* indeed it is only by the dissection of these fruits, and the examination of the elements of which they are composed that the true character of this species is ascertained. According to the figures and description of *Lichen spongiosus*, Sm. E. Bot. 1374, it is identical with the present species.

TRIBE 4. PARMELIACEÆ, (*Hook.*)

Thallus coriaceous, or membranaceous, normally frondoso-foliaceous, expanding horizontally from a centre, or fruticuloso-foliaceous, ascendant. Hypothallus rhizineform, villose, or fibrillose, adnate to the under side of the foliaceous thallus. Apothecia normally scutelliform, adnate to the upper surface of the disc, or margin of the thallus, surrounded by a thallodal exciple.

GENUS 1. STICTA, (*Schreb.*)

Apothecia at first closed, adnate to the margin, or disc of the thallus, at length scutelliform, margined by a thallodal exciple; thallamium arising from a simple hypothecium, which is placed upon the medullary stratum; asci elongato-clavate, or clavato-ventricose, each containing from 4 to 8 spores; spores fusiform, or clavato-fusiform, straight, curved, or flexuose, normally bilocular, often becoming quadrilocular, pale yellowish-brown, or subhyaline. Thallus coriaceo-membranaceous, foliaceous, variously lobed and divided, expanding horizontally; under side villose, and in the largest number of the species variegated with small urceolate cyphellæ, soredia, or discoloured maculæ.

This genus, as here defined, has been lately subdivided by DR. NYLANDER into three, *Sticta*, *Stictina*, and *Ricasolia*, separated from one another by differences in the form of the spermogones, and presence or absence of cyphellæ. But I cannot regard the characters thus obtained of sufficient permanence and importance to warrant their separation. In the genus *Ricasolia*, the spermogones are described as prominent mammillæform tubercules, and in *Sticta*, as punctiform and immersed. This character, however, is certainly not maintained throughout the species composing these genera, with that permanence which is requisite for their establishment.

1. Sticta pulmonacea, *Ach.* Thallus coriaceous, deeply sinuato-laciniated, reticulato-lacunose, olive-green, becoming brown when dry; laciniæ elongated, retuso-truncate; reticulations pale-sorediiferous; under side tomentose, variegated with naked pale maculæ. Apothecia submarginal, nearly sessile; disc plane, chestnut-coloured, surrounded by an elevated margin, which eventually becomes decorticated; asci ventricose, 6-8 spored; spores obtusely-fusiform, bilocular, becoming quadrilocular, subhyaline; ·005 in. long, by ·0015 to ·00175 in. broad. Plate 1. *fig*, ~~25.~~ 26.

Sticta pulmonacea, Ach. Syn. 233.—Fries L. Ref. 53.—Leight. Exs. 74!—Nyl. Enum. Gen. 102.—*Lichen pulmonarius*, L.—Sm. E. Bot. 572.—*Sticta pulmonaria*, Hook. Brit. Fl. 2. 206.—Schær. Enum. 30, L. H. 384!—Kbr. S. L. G. 67. Guernsey Sark

On the trunks of trees, in moist shady woods, in subalpine districts. Near Ripon! Yorkshire, *W. Brunton, Esq.* Boltby! near Thirsk, *I. G. Baker, Esq.* Hilks Wood, Ingleborough! *Dr. Carrington.* Harpford Wood! Devonshire, *Miss M. Atwood.* Ingleby Park! Kildale! Westerdale! and Oggeray Gill! Cleveland, Yorkshire.

2. Sticta scrobiculata, (*Scopol.*) Thallus coriaceous, somewhat loosely adherent, roundly lobed, scrobiculate, sorediiferous, glaucous-green, or grey; soredia lead-colour, irregularly scattered, but most abundant near the margins of the lobes; under side light-brown tomentose, variegated with naked, white maculæ. Apothecia scattered; disc plane, reddish-brown, surrounded by a thickish, inflexed, thallodal margin; asci elongato-clavate, 8 spored; spores fusiform, straight, curved, or fluxuose, bilocular, becoming irregularly quadrilocular, pale yellow, or subhyaline, ·010 to ·015 in. long, by ·00175 in. broad. Plate 1. *fig.* ~~26.~~ 25.

Lichen scrobiculatus, Scopol. Carn. 384.—Sm. E. Bot. 497.—*Sticta scrobiculata*, Ach. Syn. 234.—Fries L. Ref. 53.—Hook. Brit. Fl. 2. 206. —Tayl. Fl. Hib. pt. 2. 151.—Schær. Enum. 31, L. H. 490!—Leight. Exs. 201!—Kbr. S. L. G. 66.—Nyl. Enum. Gen. 102.

On the trunks of trees, and upon rocks among mosses, in mountainous districts. Eglestone! Durham, *Rev. J. Harriman.* Glen Nevis, Lochaber! *Dr. Lindsay.* Near Ripon! Yorkshire, *W. Brunton, Esq.* Exeter! Devonshire, *Mr. E. Parfitt.* Oggeray Gill! Cleveland, Yorkshire. Guernsey Sark

3. Sticta sylvatica, (*L.*) Thallus coriaceo-membranaceous, laciniato-lobed, lacunulose, greenish-brown, or when dry reddish-brown; lobes rather narrow, rounded, crenulate, their upper surface often rough with dark-brown granulations; under side tawny-brown, cyphellæferous; cyphellæ urceolate, minute, creamy-white. "Apothecia peltate, marginal, reddish-brown." Spores......?

Lichen sylvaticus, L.—Sm. E. Bot. 2298.—*Sticta sylvatica*, Ach. Syn. 236.—Fries L. Ref. 51.—Hook. Brit. Fl. 2. 207.—Tayl. Fl. Hib. pt. 2. 152.—Leight. Exs. 109!—Kbr. S. L. G. 65.—Nyl. Enum. Gen. 102, L. P. 111!—*Peltigera sylvatica*, Schær. Enum. 22. L. H. 258!

On rocks among mosses, and on the ground about the roots of trees, in shady woods, in subalpine and alpine districts. Birks of Aberfeldy! *H. Macmillan, Esq.* Drumlanrig wood, *Mr. W. Stevens.* Braemar! *Mr. A. Croall.* The apothecia have never been found in this country. In habit and general appearance this species is somewhat allied to *S. fulginosa,* but may be distinguished from it by the thallus being usually more deeply divided, and by the narrower lobes, and fewer granulations on their upper surface, (and also by the form of the apothecia ?)

4. Sticta fuliginosa, (*Dicks.*) Thallus coriaceo-membranaceous, expanding from a centre, roundly-lobed, sublacunose, dark lurid-grey, or greenish-brown; lobes generally broad and rounded, their upper surface rough with numerous dark-brown or nearly black granulations; underside pale brown, tomentose, cyphellæferous; cyphellæ urceolate, small, creamy white. Apothecia sparingly scattered over the disc of the lobes; disc plane, or slightly convex, reddish-brown, surrounded by a rather thick crenated thallodal margin; asci 6-8 spored; spores fusiform, bilocular often becoming quadrilocular, subhyaline; ·005 to ·006 in. long, by ·00125 to ·00175 in broad.

Lichen fulginosus, Dicks. Crypt. Fasc. 1. 13.—Sm. E. Bot. 1103.—*Sticta fuliginosa,* Ach. Syn. 236.—Fries L. Ref. 52.—Hook. Brit. Fl. 2. 206.—Tayl. Fl. Hib. pt. 2. 152.—Schær. Enum. 32, L. H. 386!—Leight. Exs. 142!—Kbr. S. L. G. 66.—Nyl. Enum. Gen. 102, L. P. 30!—*S. sylvatica, β. fuliginosa,* Hepp. Eur. 371!.

On rocks and trees, in alpine and subalpine districts. Trees, Banks of Crinan Canal! *Dr. Lindsay.* Coill-dh'ue, near the entrance of Glenlyon! *H. Macmillan, Esq.* Whitecliff Rocks, Ludlow, Shropshire!; and (in fruit!) Keswick, Cumberland! *Rev. W. A. Leighton.* Chiefly distinguished from the preceding species, by its broader and roundly lobed thallus, numerous nearly black granulations, and by the situation and form of its apothecia.

Guernsey
Sark

4. Sticta limbata, (*Smith.*) Thallus membranaceous, expanding from a centre; broadly and roundly lobed, smooth, sorediiferous, glaucous-brown; soredia grey or pale lead-coloured, irregularly scattered, most abundant on, or near, the margin of the lobes; under side light-brown, tomentose, cyphellæferous; cyphellæ urceolate, rather distantly scattered, minute, whitish. Apothecia scattered, appressed; disc brown, surrounded by a slightly elevated thallodal margin; asci 6-8 spored; spores fusiform, bilocular, often becoming irregularly quadrilocular, internally subgranular, subhyaline; ·005 to ·006 in. long, by ·00125 to ·0015 in. broad.

Lichen limbatus, Sm. E. Bot. 1104.—*Sticta limbata,* Ach. Syn. 236.—Fries L. Ref. 52.—Hook. Brit. Fl. 2. 206.—Tayl. Fl. Hib. pt. 2. 152.—Schær. Enum. 32, L. H. 557!—Kbr. S. L. G. 68.—Hepp. Eur. 369!—Nyl. Enum. Gen. 102.

On shady rocks, and about the roots of trees among mosses, in mountainous districts. Harnbury Gill! Teesdale, Durham, *Rev. J. Harriman.* Glen Nevis! Lochaber, *Dr. Lindsay.* Near Cork! and near Muckross! Killarney, *I Carroll, Esq.* Near Exeter! Devonshire, *Mr. E. Parfitt.* Birks of Aberfeldy! Perthshire, *H. Macmillan, Esq.*

Guernsey
Sark

6. Sticta damæcornis, *Ach.* Thallus coriaceous, variously imbricato-lobed, smooth, naked, pale yellowish-green when wet, brown when

dry; lobes more or less dilated, sinuated, entire, the extremities bifid, retuso-truncate; under side dark brown, tomentose, cyphellæferous; cyphellæ numerous, urceolate, brownish-white. Apothecia marginal, or on the disc of the lobes, sessile; disc at first plane, light chestnut-coloured, afterwards convex, dark-brown; margin smooth, and entire when young, flexuose and somewhat crenulated when old; asci ventricose, each containing 6 or 8 spores; spores fusiform, or subfusiform, normally bilocular, at times quadrilocular, internally more or less granular, subhyaline; ·005 to ·006. in. long, by ·0015 in. broad.

α. MACROPHYLLA, (*Hook.*) Thallus, etc., as above.

Sticta macrophylla, Hook. Brit. Fl. 2. 205.—Borr. in E. Bot. Suppl. 2697.—Tayl. Fl. Hib. pt. 2. 150.—*Sticta damæcornis*, Ach. var. *macrophylla*, Nyl. Enum. Gen. 102.

On shady rocks near Killarney! Ireland, *I. Carroll, Esq.* According to DR. NYLANDER, *S. macrophylla* is only a variety of *S. damæcornis*, which is apparently one of those multiform species, which is met with now and then in the different tribes of Lichens. It is composed of eight or ten well characterised forms, some of which in all probability are distinct species. So far as the Irish form of the plant in question is concerned, it is very distinct from any other British species, and consequently in little or no danger of being confounded with them. Its spermogones closely resemble those of *S. herbacea* and *glomulifera*, which shews very clearly the unwarrantableness of founding genera upon their form, to the exclusion of characters furnished by the other organs. They are ordinarily mammillæform, prominent, indiscriminately scattered over the superior surface of the thallus, but usually most abundant near the margin of the lobes. The spermatia are straight, cylindrical, ·001 to ·0015 in. long, by ·00012 in. broad.

7 STICTA ELEGANS, (*Deak.*) Thallus coriaceo-membranaceous, minute, sinuato-lobed, imbricated, smooth, pale greenish-ash colour, the margins finely lacerato-lacinated; under side pale brown, tomentose, cyphellæferous; cyphellæ sparingly scattered, urceolate whitish, or cream-coloured. Apothecia. . . . . . ?

Sticta elegans, Deak. M. S. in Leight. Brit. Exs. 173!

On rocks and stems of ivy. Rock Walk, Ilsham! near Torquay, *Rev. W. A. Leighton.* Killarney! *I. Carroll, Esq.* The present species, apparently, is closely allied to *S. Dufourii*, and further and more extended observation will probably shew that it is a variety of it.

8. STICTA CROCATA, (*L.*) Thallus coriaceo-membranaceous, sinuated, broadly and roundly lobed, dark olive-green, reticulato-lacunose; the reticulations and margins sorediiferous, soredia bright lemon-coloured; under side reddish-brown, tomentose, cyphellæferous; cyphellæ minute, scattered, pale lemon-coloured. Apothecia irregularly scattered; disc plane, dark-red or brownish-black, surrounded by a thinnish thallodal margin; asci elongated, subventricose, 6-8 spored; spores fusiform, bilocular, or irregularly quadrilocular, pale yellowish-brown; ·005 to ·007 in. long, by ·0015 to ·00175 in. broad.

Lichen crocatus, L.—Sm. E. Bot. 2110.—*Sticta crocata*, Ach. Syn. 231.—Hook. Brit. Fl. 2. 205.—Tayl. Fl. Hib. pt. 2. 151.—Schær. Enum. 33.—Nyl. Enum. Gen. 103.

On trees and rocks, in the Highlands of Scotland. On rocks east of

Dalmahoy Hill ! near Edinburgh, *Dr. Maingay.* Birks of Aberfeldy ! *H. Macmillan, Esq.* I have never seen apothecia on British specimens; the above description of both them and the spores, has been drawn up from a South African specimen.

9. STICTA AURATA, *(Smith.)* Thallus coriaceo-membranaceous, sinuated, broadly and deeply lobed, undulated, smooth, reddish-brown; the margins crenate, and generally suffused with a golden-yellow powder; under side tomentose, nearly black in the centre, brown towards the circumference, cyphellæferous; cyphellæ very minute, scattered, urceolato-coarctate, pulverulent, golden-yellow. "Apothecia large, flat, deep-brown; with a crenated border bearing golden-yellow powder." Spores. . . . . . ?

Gn

Serk

Lichen auratus, Smith E. Bot. 2359.—*Sticta aurata*, Ach. Syn. 232. —Hook. Brit. Fl. 2. 205.—Schær. Enum. 33, L. H. 558!—Nyl. Enum. Gen. 103.—Hepp. Eur. 372 !

On trees and rocks, among mosses. Sark ! *Rev. T. Salwey.* Scilly Islands ! *Miss Miller.* The apothecia of this truly elegant species, I believe, has never been observed on specimens found in Great Britain. The spermogones are not unfrequent. They are very minute, brown, punctiform, irregularly scattered over the superior surface of the thallus, but generally most abundant near the margin of the lobes; sterigmata articulated; spermatia straight, cylindrical, ·001 to ·00125 in. long, by ·00012 in. broad.

10. STICTA* INTRICATA, (*Del.*) Thallus coriaceo-membranaceous, sinuated and deeply lobed, lacunose, somewhat shining, greenish-brown when recent, reddish-brown when dry, sorediiferous; soredia small, verrucæform, greyish-white or pale lead-coloured, irregularly scattered, but most abundant next the margin of the lobes, or about their extremities; lobes variable in width, sometimes subcanaliculate, at other times rather short and dilated; under side dark reddish-brown in the centre, pale brown towards the circumference, tomentose. (Cyphellæ none ?) Apothecia. . . . . . ?

α. THOUARSII, (*Del.*) Thallus, etc., as above.

Sticta Thouarsii, Del. St. p. 90, t. 8, f. 29. (fide Nyl.)—*Stictina intricata*, var. *Thouarsii*, Nyl. Syn. Lich. ined.

On trees and rocks, among mosses, etc. Cromaglown ! Ireland, *I. Carroll, Esq.* Inverary ! Scotland, *Admiral Jones.* DR. NYLANDER regards the present as a variety of his *Stictina intricata*, which is composed of three forms, which he characterises thus,—1. GYMNOTOMA, thallus not sorediiferous.—2. OBSCURIOR, thallus brownish, for the most part lurid in the centre, the lobes rather broad.—3. THOUARSII, thallus pale brown, lobes rather short, the upper surface sorediiferous. This last form only occurs in Great Britain. At first sight this plant looks like a state of *S. sylvatica*, and probably may have been passed over as a variety of it; but if closely examined, it will be found to differ essentially from the usual form of that species, by its thallus being more deeply lobed, lobes often much narrower, the upper surface always sprinkled over with greyish-white powdery excrescences, and by the absence of cyphellæ. The apothecia I have not seen, nor heard of their discovery. For the addition of the present species to the British Lichens, we are indebted to the researches of *I. Carroll, Esq.*, of Cork, and to *Admiral Jones*, of Dublin.

11. STICTA GLOMULIFERA, (*Lightf.*) Thallus coriaceo-cartilaginous, thick, orbicular, laciniated, smooth, from glaucous-green, becoming greyish-white or pale brown; laciniæ elongated, sinuato-lobed; bearing large tufted excrescences of a dark-green, or greenish-brown colour; under side light-brown, tomentose; cyphellæ none. Apothecia slightly elevated, scattered; disc from concave becoming plane, reddish-brown, surrounded by an elevated, thallodal margin; asci subventricose, 8 spored; spores elongato-fusiform, or clavato-fusiform, bilocular, or quadrilocular, internally more or less granular, subhyaline; ·009 to ·012 in. long, by ·00125 to ·0015 in. broad.

Lichen glomuliferus, Lightf.—Sm. E. Bot. 293.—*Parmelia glomulifera*, Ach. Syn. 195.—Hook. Brit. Fl. 2. 198.—*Sticta glomerulifera*, Fries L. Ref. 54.—Leight. Exs. 110!—*Parmelia herbacea*, Tayl. Fl. Hib. p. 2. 141 in pt.—*Parmelia amplissima*, Schær. Enum. 33, L. H. 559!—*Sticta amplissima*, Kbr. S. L. G. 68.—*Ricasolia glomulifera*, Nyl. Enum. Gen. 103.

On the trunks of old trees, in mountainous districts. Moncrieff Hill! Perth, *Dr. Lindsay*. Sedbergh! Westmoreland, *Mr. S. Slinger*. Near Aberfeldy! Perthshire, *H. Macmillan, Esq* Near Middleton! Teesdale, *W. Brunton, Esq.*

Serk.
Guernsey.

Ric

12. STICTA HERBACEA, (*Huds.*) Thallus membranaceous, orbicular, laciniato-lobed, smooth, bright-green when recent, pale brown when dry; laciniæ sinuato-repand, rounded at the apices, the margins crenated; under side pale brown, tomentose; cyphellæ none. Apothecia slightly elevated, scattered, often very numerous; disc plane, orange-brown, surrounded by an inflexed, thallodal margin; asci clavate, 8 spored; spores fusiform, bilocular, or quadrilocular, internally more or less granular, subhyaline; ·007 to ·009 in. long, by ·00125 to ·0015 in. broad. PLATE 2, *fig.* 27.

Lichen herbaceus, Huds.—*L. læte-virens*, Lightf.—Sm. E. Bot. 294. —*Parmelia herbacea*, Ach. Syn. 298.—Hook. Brit. Fl. 2. 200.—*Sticta herbacea*, Fries L. Ref. 55.—Leight. Exs. 75!—*Parmelia læte-virens*, α. Schær. Enum. 35, L. H. 560!—*Ricasolia herbacea*, Nyl. Enum. Gen. 103.

Guernsey
Serk.

On the trunks of trees, decayed wood, and on rocks in moist shady places, in mountainous districts. Helks Wood, Ingleborough! *Dr. Carrington*. Strath Braan Woods, Dunkeld, and near Thirsk! *I. G. Baker, Esq.* Hackfall, near Ripon! *W. Brunton, Esq.* Sedbergh! Westmoreland, *Mr. S. Slinger*. Drumlanrig Wood! Scotland, *Mr. W. Stevens*. Baysdale! Cleveland. This differs from the preceding species, by its thallus being much thinner, of a different colour, and never bearing large glomeruli; its apothecia also, are more abundant, flatter, and of lighter colour. The form of the spermogones is precisely the same in both species. They are irregularly scattered, but most abundant next the margin of the lobes, mammillæform, prominent, of the same colour as the thallus, except the ostiole, which is brown; sterigmata articulated; spermatia straight, cylindrical, ·00125 to ·0015 in. long, by ·00012 in. broad. The form of the sterigmata and spermatia may be said to be identical in all the *Stictæ*, at least they have always appeared so to me, and if there is any variation it is both slight and unimportant.

* "STICTA CILIATA, *Tayl.* Thallus foliaceous, dark olive-green

when wet, glaucous-grey when dry; lobes rounded, nearly entire, ciliated; buds in dark-grey, minute granulations on the suface; cyphellæ immersed, concave; apothecia unknown.

On Hypna, on the stems of trees in Askew Wood, county of Kerry. The lobes scarcely exceed two-tenths of an inch in diameter, and are often much smaller; ascending through the moss, their edges are deflexed, and consequently the outline has a rounded appearance; ciliated with whitish, rather flat, linear, tricæ; entire, yet occasionally a minute, flat process issues suddenly from the edge, on which is borne a circular ciliate thallodal expansion, being the evolution of a bud. The upper surface is in part rough with contiguous buds. Beneath, the frond has elevated whitish veins, as in *Peltidea*, and in the interstices, a few scattered *cyphellæ* immersed below the surface, whose mouths, however, are elevated. *Tayl. Fl. Hib.* pt. 2. 152."

I have never seen a specimen of this species, consequently I am unable to form an opinion as to its distinctness, and, therefore, place it here for the present. A specimen is much desired.

GENUS 2. PARMELIA, (*Ach.*)

Apothecia at first closed, generally adnate to the disc of the thallus, subpedicellate, or sessile, at length open, expanded, scutelliform, margined by a thalodal exciple; thalamium usually thin, arising from a thin simple hypothecium, which is placed upon the gonidiac stratum; asci clavate, or oblongo-obovate, each containing 8 spores; spores elliptical, oblong, or ovate, unilocular, uncoloured. Thallus imbricato-foliaceous, expanding from a centre; under side more or less fibrous, discoloured, never cyphellæferous.

§. 1. GLAUCESCENTES.—*Thallus normally grey, greyish-white, or glaucous.*

1. PARMELIA PERLATA, (*L.*) Thallus membranaceous. suborbicular, imbricato-lobed, glaucous or greyish-white; lobes rounded, subascending, sinuated, and crenate, the margins plane and naked, or sorediiferous; underside blackish-brown, somewhat shining, sparingly fibrous. Apothecia at first subcyathiform, afterwards scutelliform; disc concave, olive-brown, surrounded by a thin inflexed thallodal margin; asci obovato-saccate, 8 spored; spores elliptical, unilocular, subhyaline, or hyaline; ·0025 to ·003 in. long, by ·001 in. broad.

Guernsey
Serk
Jersey.

Lichen perlatus, L.—Sm. E. Bot. 341.—*Parmelia perlata*, Ach. Syn. 197.—Fries L. Ref. 59.—Hook. Brit. Fl. 2. 200.—Tayl. Fl. Hib. pt. 2. 148.—Schær. Enum. 34, L. H. 360!—Leight. Exs. 76!—Nyl. Enum. Gen. 104.—*Imbricaria perlata*, Kbr. S. L. G. 69.

On the trunks of old trees, not unfrequent. On old apple trees (in fruit), near Knockmore! Ireland, *I. Carroll, Esq.* Kinnoul Hill! Perth; Caerlaverock Road! Dumfries; and Quiraing! Sky, *Dr. Lindsay.* Penzance! Cornwall, and Stoke Wood! Devonshire, *Mr. E. Parfitt.* Near Lewes! Sussex, *W. Unwin, Esq.* Near Ilfracombe! *Miss M. Atwood.* Helks Wood! Ingleborough, *Dr. Carrington,* Boudsdale Gill! Cleveland, Yorkshire.

β. CILIATA, D.C. Thallus membranaceous, foliaceous, deeply lobed, imbricated, very often isidiiferous, rugose, glaucous-green, greyish-white when dry; lobes rounded, ascending, subcrenate, the margins fringed with black fibres, not sorediiferous; under side black, rugose, fibrous. Apothecia large, subinfundibuliform; disc concave, at length perforated and explanate, surrounded by an entire thallodal margin. Spores as above.

Parmelia perlata, var. *ciliata*, DC. Nyl. Enum. Gen. 104.—*Lichen perforatus*, Ach. Prod ?.—Sm. E. Bot. 2423.—*Parmelia perforata*, Fries L. Ref. 58.—Hook. Brit. Fl. 2. 200.—Schær. Enum. 34.—Leight. Exs. 112!—*Parmelia proboscidea*, and *P. reticulata*, Tayl. Fl. Hib. pt. 2. 143, and 148.—*Imbricaria perforata*, Kbr. S. L. G. 69.

On the trunks of old trees, and on rocks, in alpine and subalpine districts. Banks of Crinan Canal! Argyleshire, (sub nom. *P. perlala*), *Dr. Lindsay*. Near Glenoran! Co. Antrim! *D. Moore, Esq.* Near Sedbergh! Kendal, *Mr. S. Slinger*. Penzance! Cornwall, *Mr. E. Parfitt*. All the British specimens of *Parmelia perforata*, are apparently referrible to the present variety of *P. perlata*, which only differs from the normal form of that species, by the upper surface of the thallus being isidiiferous, the margin of the lobes plane, crenate, not sorediiferous, and by the under surface being rugose and more abundantly fibrous. Both forms are liable to be confounded with *Cetraria glauca*, but in the absence of apothcia, if the fibrous under surface of the present form be regarded, no difficulty need be feared, as this single character is sufficient to separate them.

2. PARMELIA TILIACEA, (*Ehrh.*) Thallus coriaceo-membranaceous, imbricated, sinuato-lobed, pale glaucous-grey; lobes rather short, undulated, the margins naked, inciso-crenate; under side dark-brown, black-fibrillose. Apothecia mostly in the centre of the thallus; disc from concave, becoming nearly plane, bright bay-coloured, surrounded by an incurved, entire or crenated margin; asci clavate, 8 spored; spores oblong, or ovate, unilocular, hyaline, or subhyaline; ·002 to ·0025 in. long, by ·001 in. broad. PLATE 2. *fig.* 28.

Lichen tiliaceus, Ehrh.—Sm. E. Bot. 700.—*Parmelia tiliacea*, Ach. Syn. 299.—Fries L. Ref. 59 in pt.—Hook. Brit. Fl. 2. 200.—Nyl. Enum. Gen. 104.—*P. quercifolia*, α. *tiliacea*, Schær. Enum. 44, L. H. 358!—*Imbricaria tiliacea*, Kbr. S. L. G. 70.

β. SCORTEA, (*Ach.*) Thallus orbicular, subcoriaceous, sinuato-lobed, greyish-white; lobes short, rounded, undulated, the margins inciso-crenate; the central part of the thallus often isidiiferous,; isidia grey, soon dissolved, pulverulent; under side rugose, brownish-black, fibrous.

Lichen scorteus, Ach. Prod. 9.—Sm. E. Bot. 2065.—*Parmelia scortea*, Ach. Syn. 197.—Hook. Brit. Fl. 2. 199.—Leight. Exs. 87!—*Parmelia tiliacea*, Fries L. Ref. 59 in pt.—*P. quercifolia*, *b. furfuracea*, Schær. Enum. 44, L. H. 359!

On the trunks of trees, old pales, &c., but not common, at least in the North of England. Near Exeter! Devonshire, *Mr. E. Parfitt*. Stanstead Park, Essex! *Mr. R. Jacob*. Near Lewes! Sussex, *W. Unwin, Esq.* Laskill! Bilsdale, *I. G. Baker, Esq.* Near Settle! *Dr. Windsor*. Near Bedale! and near Stokesley! Yorkshire. *Parmelia scortea*, appears to me to be only a form of *P. tiliacea*. The spermogones are usually very abundant, especially in the normal form. They are very minute, punctiform, brownish-black, often slightly raised above the level of the thallus, and causing its surface to appear rugose, and at times they are surrounded by a thin whitish rim. The sterigmata are short, articulated. The spermatia are straight, cylindrico-subacicular, ·0015 to 00175 in. long, by 00012 in. broad.

3. PARMELIA BORRERI, *Turn.* Thallus suborbicular, cartilagineo-membranaceous, broadly and roundly lobed and sinuated, subreticulato-lacunose, glaucous-grey, rugoso-sorediiferous ; soredia verrucæform, white, irregularly scattered; under side brown, subfibrillose. Apothecia large, scattered, sessile; disc bright chestnut-coloured, at first concave, afterwards nearly plane, often undulated, surrounded by an elevated, inflexed thallodal margin; asci obovato-saccate, 8 spored; spores elliptical, or ovate, unilocular, subhyaline, or hyaline ; ·003 to ·004 in. long, by ·0015 to ·002 in. broad. PLATE 2, *fig.* 29.

Parmelia Borreri, Turner in Linn. Trans. 9, 148. tab. 13. f. 2.—Fries L. Ref. 60.—Hook. Brit. Fl. 2. 199.—Leight. Exs. 231!—Tayl. Fl. Hib. pt. 2. 146.—Kbr. S. L. G. 71.—Nyl. Enum. Gen. 105.—*Lichen Borreri,* Sm. E. Bot. 1780.—*Par. dubia,* Schær. Enum. 45, L. H. 361!

On the trunks of trees, and on rocks, in mountainous districts. Near Wicklow! Ireland, *Dr. Maingay.* Penzance! *Rev. T. Salwey.* Stanstead Park! Essex, *Mr. R. Jacob.* Sussex! *W. Unwin, Esq.* Readily known and distinguished, from all the states of *P. saxatilis,* its nearest ally, by the numerous elevated sorediiferous excrecences, which give the thallus a remarkably rough verrucose aspect, and renders its identity clear and unmistakable. The large spores, independent of the other characters, will always prevent its confusion with *P. tiliacea.*

4. PARMELIA SAXATILIS, (*L.*) Thallus subcartilagineo-membranaceous, suborbicular, laciniated, subimbricated, reticulato-lacunose, naked or ruguloso-furfuraceous, glaucous-grey ; laciniæ sinuato-lobed, the apices retuse ; under side black, or brownish-black, densely fibrous. Apothecia scattered, slightly elevated; disc concave, becoming nearly plane, bright chestnut-coloured, surrounded by an inflexed, crenate, thallodal margin; asci elongated, 8 spored; spores elliptical, unilocular, subhyaline or hyaline; ·0035 in. long, by ·002 to ·00225 in. broad.

Lichen saxatilis, L.—Sm. E. Bot. 603.—*Parmelia saxatilis,* Ach. Syn. 203.—Fries L. Ref. 61.—Hook. Brit. Fl. 2. 199.—Nyl. Enum. Gen. 105.—Tayl. Fl. Hib. pt. 2. 144, and *P. horrescens,* Tayl. Fl. Hib. pt. 2. 144.—*Imbricaria saxatilis,* Kbr. S. L. G. 72.

On the trunks of trees, rocks, &c., extremely common. The spermogones are of frequent occurrence. They are very minute, black, punctiform, scattered in an irregular manner towards the extremities of the lobes, but most frequent on those which are free from isidioid excrescences ; sterigmata articulated, mixed with very fine branched hyaline filaments; spermatia straight, cylindrical or cylindrico-acicular, ·001 to ·00125 in. long, by ·0001 in. broad.

β. LEUCOCHROA, (*Wallr.*) Thallus glaucous-grey; laciniæ variable in width, sometimes broad, at others narrow, irregularly imbricated reticulato-lacunose, subsorediiferous ; soredia rounded or linear-elongated, subpulverulent. Apothecia as above.

Parmelia saxatilis, var. *leucochroa,* Wallr. Crypt. Germ. 1. 499.—

Schær. Enum. 44, L. H. 362!—*P. saxatilis*, var. Leight. Exs. 203!—*Parmelia sulcata*, Tayl. Fl. Hib. pt. 2. 145.

On the trunks of trees, and at times on rocks; common.

γ. FURFURACEA, (*Schær.*) Thallus greyish-white, densely clothed with greyish-brown isidioid excrescences. Otherwise as in the preceding.

Parmelia saxatilis, var. *furfuracea*, Schær. Enum. 45, L. H. 363!—Leight. Exs. 46!

On rocks and stones, common in mountainous districts.

δ. OMPHALODES, (*L.*) Thallus subcartilaginous, smooth, shining, dark purplish-brown; laciniæ narrow, deeply divided, sinuated, and imbricated, the apices subtruncate; under side black, densely black-fibrillose. Apothecia dark chestnut-brown, the margin crenate, inflexed. Spores as in *saxatilis*.

Lichen omphalodes, L.—Sm. E. Bot. 604.—*Parmelia omphalodes*, Ach. Syn. 203.—Hook. Brit. Fl. 2. 199.—Tayl. Fl. Hib. pt. 2. 145.—*P. saxatilis, β. omphalodes*, Fries L. Ref, 62.—Schær. Enum. 45, L. H. 488!—Leight. Exs. 7!—Nyl. Enum. Gen. 105.—*Imbricaria saxatilis, β. omphalodes*, Kbr. S. L. G. 72.

On rocks, in alpine and subalpine districts; common. This variety is chiefly distinguished from the ordinary form of *P. saxatilis*, by the rich purplish-brown colour of its thallus. Their apothecia and spores are similar. The spermogones are more variable in their outward form, being sometimes quite prominent and papillæform, at other times more flattened or only slightly prominent, and at others punctiform and similar to those of *saxatilis*; the sterigmata and spermatia are the same in both varities. The present species presents us with another example of the unwarrantableness of founding genera on the external form of the spermogones. There cannot be a doubt but that *P. omphalodes* is only a variety of *P. saxatilis*, and yet these bodies are presented to us under a threefold form.

5. PARMELIA SINUOSA, (*Sm.*) Thallus membranaceous, suborbicular, imbricato-lobed, smooth, glaucous, or sulphureous-grey; laciniæ sublinear, dilated outwards, sinuato-pinnatifid, the sinuses wide, circular; under side black in the centre, brownish-black near the circumference, black-fibrillose. Apothecia sligtly elevated; disc nearly plane, dark-brown, surrounded by a thin, smooth, entire margin. Spores. . . . . . ?

Lichen sinuosus, Sm. E. Bot. 2050.—*Parmelia sinuosa*, Ach. Syn. 207.—Fries L. Ref. 63, in pt.—Hook. Brit. Fl. 2. 203.—Tayl. Fl. Hib. pt. 2. 149.—Nyl. L. P. 112!—*P. sinuosa, β. relicina*, Schær. Enum. 43. —*P. Forsteri*, Leight. Exs. 202!

On rocks and walls, rarely on trees. Helks Wood! Ingleton, *Dr. Carrington.* On pine trees, Bournemouth! *Rev. W. A. Leighton.* Lynton! North Devonshire, *Miss M. Atwood.*

β. LÆVIGATA, (*Sm.*) Thallus membranaceous, suborbicular, imbricato-lobed, smooth, greyish-white; laciniæ multifid, somewhat linear, or dilated, the ultimate segments divaricated and more or less attenuated, often sorediiferous; under side black, fibrous; fibres much branched, black. Apothecia scattered; disc concave, chestnut-coloured, surrounded by an entire, inflexed margin; asci 6-8 spored; spores elliptical, unilocular, subhyaline; ·0025 to ·003 in. long, by ·001 in. broad.

Lichen lævigatus, Sm. E. Bot. 1852.—*Parmelia lævigata*, Ach. Syn. 212.—Hook. Brit. Fl. 2. 200.—Tayl. Fl. Hib. pt. 2. 148, and *P. rugosa*, Tayl. Fl. Hib. pt. 2. 145.—*P. sinuosa*, *α. lævigata*, Schær. Enum. 43.

On rocks and walls, in alpine, or mountainous districts. On the banks of Blackwater River! county of Kerry, *Dr. Taylor.* Pass of Rein-an-Eigh! Co. Cork, *I. Carroll, Esq.* Near Lynton! North Devonshire, *Miss M. Atwood.* Counemara! *D. Moore, Esq.* *P. rugosa* of Taylor, appears to me to be altogether inseparable from the present form, which I regard as a state of *P. sinuosa.* The thallus of *lævigata*, is usually much divided and separated into narrow laciniæ, which at times bear a few rather large serediiferous excrescences, especially near their extremities; the fibres also, on its under surface, are generally much branched and tufted, but in all other respects it is similar to *P. sinuosa.* The apothecia of both forms are of rare occurrence. The spermogones of *lævigata* are common. They are minute, of a dark-brown colour, or nearly black, punctiform, slightly prominent, and at times causing the surface of the thallus to appear rough, irregularly scattered, but most abundant about the middle of the segments, and especially on those which are rather convex; sterigmata articulated; spermatia straight, cylindrical, ·00125 to ·0015 in. long, by ·00012 in. broad.

γ. concentrica, (*Leight,*) Thallus subcartilagineo-membranaceous, free, pale glaucous; lobes very minute imbricated, at length involved, and eventually globular. Apothecia. . . .?

Parmelia saxatilis, var. *concentrica*, Leight. Exs. 232!—*P. sinuosa*, var. *eratica*, Linds. Mem. Sper. & Pyc. of Fo. Lich. 218.

On the ground, but generally unattached. Melbury Hill! near Shaftesbury, Dorsetshire. A very curious state, but one which evidently owes its origin to local circumstances. The whole of the thallus is free, or unattached, and liable to be blown about by the wind, and by being so, the lobes become wrapt inwards upon themselves and formed into little balls of a somewhat globular figure.

6. Parmelia physodes, (*L.*) Thallus membranaceous, suborbicular, loosely adherent, imbricato-lobed, smooth, glaucous-white; laciniæ linear, sinuato-multifid, somewhat convex and inflated, the apices at length serediiferous; under side naked, rugulose, brownish-black. Apothecia subpedicellate; disc concave, becoming nearly plane, and flexuose, surrounded by a thin elevated margin; asci 8 spored; spores oblong, or ovate, unilocular, subhyaline, or hyaline; ·0015 to ·002 in. long, by ·00075 to ·001 in. broad.

Jerk

Lichen physodes, L.—Sm. E. Bot. 126.—*Parmelia physodes*, Ach. Syn. 218.—Hook. Brit. Fl. 2. 204.—Fries L. Ref. 64.—Leight. Exs. 48!—*Parmelia ceratophylla*, *α. physodes*, Schær. Enum. 42, L. H. 366! —*Imbricaria physodes*, Kbr. S. L. G. 75.—*Parmelia physodes*, Nyl. Enum. Gen. 104.

β. vittata, (*Ach.*) Laciniæ linear-elongated, divaricatedly divided, rarely serediiferous, greyish white. Apothecia large, pedicellate; disc concave, becoming nearly plane, brown, surrounded by a very thin margin. Otherwise as above.

Parmelia physodes, var. *vittata*, Ach. Meth. 251.—Schær Enum. 42. L. H. 367!

γ. TUBULOSA, *Schær.* Laciniæ lax, ascendant, tubulose, glaucous-grey; the extremities turgid and sorediiferous. Otherwise as above.

Parmelia physodes, var. *tubulosa*, Schær. Enum 42.

On the trunks of trees, stems of heath, old walls, rocks, &c., common in mountainous districts, but not often found bearing apothecia. In fruit, Knock Hill, Crieff! *Dr. Lindsay.* These specimens are referrible to the variety *vittata.* Near Ripon! Yorkshire. *W. Brunton, Esq.* Malham! *Dr. Carrington.* Sussex! *Mr. John Hemmings.* Baysdale! and in Kildale! Yorkshire. The spermogones are of very frequent occurrence in all the varieties, They are minute, black, punctiform, very slightly raised above the level of the surface of the thallus, usually placed near the ends of the laciniæ, and are often so numerous and crowded as to cause them to have a blackened aspect. The sterigmata are articulated, and often mixed with very fine hyaline filaments. The spermatia are straight, cylindrical, or cylindrico-acicular, ·001 to ·00125 in. long, by ·0001 in. broad.

7. PARMELIA ENCAUSTA, *(Sm.)* Thallus subcoriaceo-cartilaginous, suborbicular, repeatedly laciniated, glaucous-grey, greyish-brown, or cream-coloured; laciniæ roundly-compressed, deeply and repeatedly divided, linear, convex, here and there slightly constricted, the extremities for the most part a little inflated; under side naked, black. Apothecia large, adnate; disc reddish-brown, from concave becoming nearly plane, surrounded by an inflexed and more or less crenulated thallodal margin; asci clavate, 8 spored; spores elliptical, or ovate, unilocular, subhyaline or hyaline; ·002 to ·0025 in. long, by ·001 in. broad.

Lichen encaustus, Sm. E. Bot. 2049.—*Parmelia encausta*, Ach. Syn. 206.—Hook. Brit. Fl. 2. 203.—*P. physodes*, β. *encausta*, Fries L. Ref. 64.—*P. ceratophylla*, var. *multipuncta*, Schær. Enum. 42, L. H. 368!—*Imbricaria encausta*, Kbr. S. L. G. 76.

β. CANDEFACTA, (*Ach.*) Laciniæ multifid, rounded, torulose, glaucous-grey. Apothecia very large, scattered; disc plane, undulated, reddish-brown, surrounded by an inflexed crenulated margin.

Parmelia encausta, γ. *candefacta*, Ach. L. Univ. 490.—*Parmelia ceratophylla*, var. *candefacta*, Schær. Enum. 42.—*Imbricaria ceratophylla*, var. *candefacta*, Hepp. Eur. 52!

γ. STYGIOIDES, (*Linds.*) Laciniæ multifid, torulose and somewhat articulated, or constricted, olive-brown.

Parmelia encausta, var. *stygioides*, Linds. Mem. Sper. and Pyc. Foli. Lich. 224.

On rocks in alpine districts.—α. Mayo! *D. Moore, Esq.* Ben Lawers! *Dr. Maingay.* Lochnagar! *Admiral Jones.* β. Ben Lawers! *Mr. R. Jacob.* γ. Summit of Cairngorm! Braemar, *Dr. Lindsay.* The present species is associated with *P. physodes*, by both FRIES and SCHÆRER. I believe it is quite distinct from that species, and coincide with those authors who prefer its separation. Its spermogones are abundant, and distinctly visible to the naked eye. They are scattered indiscriminately over the surface of the thallus, and bear a general resemblance to those of *P. physodes.*

8. PARMELIA TEREBRATA, (*Hoffm.*) Thallus membranaceous, orbi-

cular, repeatedly sinuato-laciniated, appressed, glabrous, greenish-grey; laciniæ convex, radiant, approximate, inflated and perforated, the extremities obtuse, often sorediiferous; under side black and rugose. Apothecia mostly in the centre, nearly sessile; disc concave, reddish-brown, surrounded by an entire inflexed thallodal margin; "asci large, obovate, 4 spored; spores elliptical, or ovate, unilocular, subhyaline."

Lobaria terebrata, Hoffm.—*Lichen pertusus*, Schrad.—*Lichen diatrypus*, Ach.—Sm. E. Bot. 1248.—*Parmelia diatrypa*, Ach. Syn. 219. —Hook. Brit. Fl. 2. 204.—Leight. Exs. 264!—*P .physodes*, b. Fries L. Ref. 64.—*Parmelia pertusa*, Schær. Enum. 43. L. H. 365!—*Imbricaria terebrata*, Kbr. S. L. G. 74.—*Parmelia pertusa*, Nyl. Enum. Gen. 104.

On the trunks of trees, and among mosses on rocks in alpine districts. Ballacheulish! Scotland, *Sir W. J. Hooker*. Barmouth! North Wales, *Rev. W. A. Leighton*. Pass of Rein-an-Eigh! Co. Cork, *I. Carroll, Esq*. Near Cushenduu! Co. Antrim, *D. Moore, Esq*. Valley of Rocks! Lynton, North Devonshire, *Miss M. Atwood*. The present species is distinguished from *P. physodes*, chiefly by the number of spores contained in each ascus, and by their form and size; but, I regret to say, on account of the limited number of specimens at my disposal, I have not been able to examine these organs myself. In an infertile state it closely resembles forms of *P. physodes*, but the perforated apices of the laciniæ will in some measure aid in its identification.

9. PARMELIA ALEURITES, (*Ach.*) Thallus membranaceous, orbicular, closely adherent, greyish-white or greyish-brown, rugoso-isidiiferous in the centre, obliterating the lobes, the circumference naked, sinuato-lobed, undulated, rounded, crenated; under side pale brown, fibrillose. Apothecia slightly elevated; disc plane, reddish-brown, surrounded by a crenulated pulverulent margin; asci 8 spored; spores elliptical, unilocular, hyaline; ·0015 in. long, by ·00075 in. broad.

Lichen aleurites, Ach. Prod.—Sm. E. Bot. 858.—*Parmelia aleurites*, Ach. Syn. 208.—Fries L. Ref. 62.—Hook. Brit. Fl. 2. 203.—Schær. Enum. 44, L. H. 489!—Leight. Exs. 47.—*Imbricaria aleurites*, Kbr. S. L. G. 73.—*Squamaria aleurites*, Nyl. Enum. Gen. 111.

On dead wood, especially oak; also on old posts, rails, etc.; not uncommon in mountainous districts. Rosedale! Farndale! and Bransdale! all in the North-east of Yorkshire; and Baysdale! Kildale! and Ingleby Park! Cleveland.

10. PARMELIA HYPEROPTA, *Ach.* Thallus membranaceous, orbicular, closely adherent, laciniato-lobed, greyish-white; central lobes slightly convex, rugoso-plicate, and farinoso-sorediiferous; those of the circumference plane, linear, and naked; under side dark-brown, fibrillose. Apothecia scattered, slightly elevated; disc plane, reddish-brown, surrounded by a somewhat crenulated thallodal margin; spores elliptico-oblong, curved, unilocular, hyaline; ·002 in. long, by ·00075 to ·001 in. broad

Parmelia hyperopta, Ach. Syn. 208.—*Parmelia ambigua*, Borr. in E. Bot. Suppl. 2796, *two upper fig. only*.—*Parmelia ambigua*, b. *albescens*, Fries L. Ref. 71—Schær. Enum. 47, L. H. 376!—*Imbricaria hyperopta*, Kbr. S. L. G 73.

On dead wood, and on Pine trees in alpine districts; but rarely met with in this country. I have seen only one British specimen, which had been collected in the Highlands of Scotland! by the *Rev. J. Dalton*.

It appears to me to be a very distinct species, and also one which may be easily distinguished, when in fruit, from both *P. aleurites*, and every other *Parmelia*, by its spores, which are generally more or less curved, assuming a somewhat lanulate, or falcate figure.

§. 2. Olivaceo-fuscæ.—*Thallus normally olive-brown, or brownish-black.*

11. Parmelia Acetabulum, (*Neck.*) Thallus membranaceo-coriaceous, rugulose, imbricato-lobed, greenish-olive; lobes rounded, subascendant and undulated in the centre, more or less appressed at the circumference; under side brown, sparingly black-fibrillose. Apothecia large; disc concave, becoming nearly plane, often flexuose, rugged, reddish-brown, surrounded by an inflexed, crenulated margin; asci clavate, 8 spored; spores oblong, or ovate, unilocular, subhyaline, or hyaline; ·00275 to ·003 in. long, by ·001 to ·0015 broad.

Lichen Acetabulum, Neck, Delic. 506.—*Lichen corrugatus*, Sm. E. Bot. 1652.—*Parmelia corrugata*, Ach. Syn. 199.—Hook. Brit. Fl. 2, 201.—*Parmelia Acetabulum*, Fries L. Ref. 65.—Schær. Enum. 35, L. H. 547!—Nyl. Enum. Gen. 105.—*Imbricaria Acetabulum*, Kbr. S. L. G. 77.

On the trunks of trees; but by no means common. Stanstead Park! Essex, *Mr. R. Jacob.* Near Ripon! Yorkshire, *W. Brunton, Esq.* Near Stokesley! and Ayton! Cleveland, Yorkshire. A much larger and more elegant species than the next, with which it has at times been confounded. The lobes of the thallus however, are much larger, and although rugulose, they are never, I believe, isidiiferous, as, is the case with that of *olivacea;* the apothecia also are much larger, being at times nearly half an inch broad. The rugulose appearance of the upper surface of the thallus, is, in a great measure due to the presence, and very great abundance, of the spermogones. They are black, or brownish-black, at first very minute, and quite immersed in the thallus, afterwards the cortex of the thallus becomes upraised around, and amongst them, forming minute subpatellæform rugosities, which eventually become confluent. Sterigmata articulated. Spermatia straight, subfusiform-acicular, ·00125 to ·0015 in. long. by ·0002 in. broad.

12. Parmelia olivacea, (*L.*) Thallus membranaceous, orbicular, appressed, plicato-radiose, rugulose, and isidiiferous, shining, olive-brown; lobes rounded, inciso-crenate; under side brown, sparingly fibrillose. Apothecia sessile or slightly elevated, mostly in the centre; disc at first concave, afterwards nearly plane, dark chestnut-coloured, surrounded by a naked or isidiiferous, inflexed, thallodal margin; asci elongato-subventricose, 8 spored; spores elliptical, unilocular, hyaline; ·002 in. long, by ·00125 in. broad.

Lichen olivaceus, L.—Sm. E. Bot. 2180.—*Parmelia olivacea*, Ach. Syn. 200.—Fries L. Ref. 66.—Hook. Brit. Fl. 2. 200.—Tayl. Fl. Hib. pt. 2. 143.—Schær. Enum. 47, L. H. 370!—Leight. Exs. 263! and 291!—Nyl. Enum. Gen. 105.—*Imbricaria olivacea*, Kbr. S. L. G. 77.

β. aquiloides, (*Linds,.*) Thallus much larger, sinuato-laciniated, olive-brown; laciniæ sublinear, deeply and repeatedly divided, the extremities more or less dilated, and crenate. Apothecia large, sparingly produced, sessile, nearly concolorous with the thallus. Otherwise as above.

Parmelia olivacea, var. *aquiloides*, Linds, Mem. Sper. and Pyc. Foli. Lich. 236.

γ. FURFURACEA, (*Schær.*) Thallus densely rugoso-isidiiferous; lobes obliterated in the centre, appressed, rounded and inciso-crenate at the circumference.

Parmelia olivacea, var. *furfuracea*, Schær. Enum. 47, L. H. 371!—*Imbricaria aspera*, Kbr. S. L. G. 78.

On the trunks of trees, rocks, stones, &c.; common. The variety *aquiloides*, is a large luxuriant state, bearing considerable resemblance to *Borrera aquila*, in the form and colour of its thallus. The spermogones are not of common occurence, they are also very difficult to recognise, on account of their minuteness, and their resemblance to the isidioid excrescences, which are so numerously scattered over the surface of the thallus of this species. They are very minute, punctiform, black, wholly immersed, or at times slightly prominent, chiefly scattered over the smooth lobes. The spermatia are short cylindrical, about ·00125 to ·0015 in. long, by 00016 in. broad.

13. PARMELIA FAHLUNENSIS, (*L.*) Thallus subcartilaginous, sinuato-lobed, imbricated, smooth and shining, from dark-olive becoming black; laciniæ linear, digitato-multifid, and somewhat crisped, subcanaliculate; under side paler, rarely fibrillose. Apothecia numerous; disc deep chestnut-coloured, at first concave, afterwards nearly plane, often flexuose; the margin elevated when young, crenulated, and eventually nearly obliterated; asci 8 spored; spores ovate or elliptical, unilocular, subhyaline, or hyaline; ·0015 to ·002 in. long, by ·00075 to ·001 in. broad.

Lichen Fahlunensis, L.—Sm. E. Bot. 653.—*Parmelia Fahlunensis*, Ach. Syn. 204.—Fries L. Ref. 66.—Hook. Brit. Fl. 2. 202.—Schær. Enum. 48, L. H. 373! and 374!—Nyl. Enum. Gen. 105.—*Imbricaria Fahlunensis*, Kbr. S. L. G. 78.

On rocks in alpine districts. Summit of Cairngorm! *Dr. Lindsay.* Lochnagar! *Mr. A. Croall.* Summit of Ben Lawers! *H. Macmillan, Esq.* Ben Nevis! *Admiral Jones.* Clougha! Lancashire, *Mr. R. Jacob.* The spermogones of this species occur in abundance, and by their presence add to the multifid and crisped appearance of the laciniæ; as, unlike the main boby of Parmeliæ, they are here placed on the margin of the laciniæ, and assume the form of minute, round, prominent, dark-brown or nearly black verrucæ, in fact, as regards both site and colour, they closely resemble those of *Cetaria nivalis*, and *C. juniperina.* The sterigmata are very obscure and mixed with much gelatinous matter. The spermatia are short subcylindrical or subelliptical, ·0005 to ·00075 in. long, by ·00016 in. broad.

14. PARMELIA STYGIA, (*L.*) Thallus subcartilaginous, imbricated, shining, from olive-brown becoming pitchy-black; laciniæ sublinear, convex, palmato-multifid, the apices recurved; under side very black, obsoletely fibrillose. Apothecia sparingly produced, large; disc at first concave, afterwards plane, and more or less undulated, concolorous, with the thallus, surrounded by a thin crenated, thallodal margin; asci minute, 8 spored; spores ovate, or elliptical, unilocular, subhyaline, or hyaline; ·0015 in. long, by ·00075 to ·001 in. broad.

Lichen stygius, L.—Sm. E. Bot. 2048.—*Parmelia stygia*, Ach. Syn. 205.—Fries L. Ref. 67.—Hook. Brit. Fl. 2. 202.—Nyl. Enum. Gen.

105.—*P. fahlunensis, β. stygia,* Schær. Enum. 48.—*Imbricaria stygia,* Kbr. S. L. G. 79.

On rocks in alpine districts. Ben Nevis, Lochaber! *Dr. Lindsay.* Caintochan! Clova, *Mr. R. Jacob.* The spermogones of this species differ much as regards site, from those of *P. Fahlunensis.* They are irregularly scattered over the convex portions of the laciniæ, and toward their apices. They are very minute, black, papillæform, the ostioles being imperceptible when young, but large and patent when old. Sterigmata articulated. Spermatia straight, cylindrical, ·00125 to ·0015 in. long, by ·00016 to ·0002 in. broad.

15. Parmelia lanata, *(L.)* Thallus subcartilaginous, repeatedly and intricately branched, olive-brown or black; branches unequal, subascendant, or decumbent, rounded, flexuose, solid, more or less polished, of one colour on both sides. Apothecia slightly elevated, sparingly produced; disc plano-convex, often undulated, concolorous with the thallus, or a little blacker, surrounded by an unequally granulated, thallodal margin; asci 8 spored; spores elliptical, unilocular, subhyaline, or hyaline; ·00225 in. long, by 00125 in. broad.

Lichen lanatus, L.—Sm. E. Bot. 846.—*Cornicularia lanata,* Ach. Syn. 846.—Hook. Brit. Fl. 2. 229.—*Parmelia stygia, β.* Fries L. Ref. 68.—*Parmelia fahlunensis, δ.* Schær. Enum. 49, L. H. 257!—*Imbricaria stygia, β.* Kbr. S. L. G. 79.

On rocks in alpine districts. Ben Macdhui! Summit of Lochnagar! and Ben Lawers! *Dr. Lindsay.* Ben Nevis! *Admiral Jones.* Near Aberfeldy! Perthshire, *H. Macmillan, Esq.* Mangerton! Co. Kerry, *I. Carroll, Esq.* The present species differs from the preceding one, by its thallus being more branched, its subascendant or decumbent habit, its branches being more slender, rounded, entangled, and concolorous on both sides, and by its smaller apothecia, and larger spores. The spermogones are common on specimens bearing apothecia, or on those which appear stunted in their growth; but less frequent on infertile, or luxuriant ones. They are brownish-black, punctiform, or minutely papillæform, irregularly scattered over the ramuli, but most abundant on the convex portions, and towards their extremities, giving the branches a somewhat knotted appearance. The spermatia are generally very abundant, straight, cylindrical, ·001 to ·00125 in. long, by ·00016 in. broad.

§. 3. Ochroleucæ.—*Thallus normally yellowish-green, or pale straw-coloured.*

16. Parmelia caperata, (*Dill.*) Thallus coriaceo-membranaceous, imbricato-lobed, undulato-plicate, rugose, or granuloso-pulverulent, pale yellowish-green; lobes sinuato-laciniated, rounded, the margins crenulated; under side black, rugose, sparingly fibrillose. Apothecia scattered, not very often present; disc concave, bright chestnut-coloured, surrounded by an elevated, crenulated, and somewhat powdery margin; asci clavate, 8 spored; spores oblong, or ovate, internally slightly granular, unilocular, subhyaline; ·00375 to ·004 in. long, by ·00125 in. broad. Plate 2. *fig.* 30.

Lichen caperatus, Dill. Musc. t. 25. f. 97.—Sm. E. Bot. 654.—*Parmelia caperata,* Ach. Syn. 196.—Fries L. Ref. 69.—Hook. Brit. Fl. 2. 198.—Tayl. Fl. Hib. pt. 2. 146.—Schær. Enum. 34, L. H. 377!—

Leight. Exs. 77!—Nyl. Enum. Gen. 104, L. P. 31!—*Imbricaria caperata*, Kbr. S. L. G. 81.

On the trunks of trees, rocks, and old pales, in mountainous districts. Near Lewes! Sussex, *W. Unwin, Esq.* Near Sedbergh! Kendal, *Mr. S. Slinger.* Wensleydale! *I. W. Watson, Esq.* Lounsdale! and Kildale! Cleveland, Yorkshire.

17. PARMELIA CONSPERSA, (*Ehrh.*) Thallus submembranaceous, imbricato-lobed, polished, pale greenish straw-coloured; laciniæ radiated, sinuato-multifid, smooth and naked at the circumference, often rugose with isidiiferous excrescences in the centre; under side dark-brown, or black, fibrillose; fibres short, black. Apothecia mostly central; disc at first concave, becoming more or less expanded, and undulated, reddish-chestnut colour, surrounded by a thin inflexed, subentire, or crenulated margin; asci cuneate, 8 spored; spores elliptical, unilocular, hyaline; ·00175 in. long, by ·001 in. broad.

Lichen conspersus, Ehrh.—Sm. E. Bot. 2097.—*Parmelia conspersa*, Ach. Syn. 209.—Fries L. Ref. 69.—Hook. Brit. Fl. 2. 199.—Schær. Enum. 46, L. H. 379!—Leight. Exs. 78!—Nyl. Enum. Gen. 105.—*Imbricaria conspersa*, Kbr. S. L. G. 81.

β. STENOPHYLLA, (*Ach.*) Laciniæ elongated, linear convex, pinnatifid, imbricato-complicated. Otherwise as above.

Ach. Meth. 206.—Schær. Enum. 46.—Leight. Exs. 79!

On rocks and stones, in alpine and subalpine districts. Blaeberry Hill, Perth! and on old walls, Moffat! Dumfriesshire, *Dr. Lindsay.* Near Dunsford! Devonshire, *Mr. E. Parfitt.* Wensleydale! Yorkshire, *I. W. Watson, Esq.* Teesdale! Durham, *Rev. J. Harriman.* The spermogones of this species occur in great profusion, and often cause the thallus to have a black-punctate appearance. They are very minute, black, punctiform, irregularly scattered over the whole surface of the thallus, but usually most abundant on the convexities, and towards the ends of the laciniæ. Sterigmata articulated, very delicate, consisting of a few cylindrical cells. Spermatia very abundant, issuing out of the minute ostioles in a long continued greyish stream; individually, they are subcylindrico-acicular, straight, ·00125 to ·0015 in. long, by ·00012 in. broad.

18. PARMELIA INCURVA, (*Pers.*) Thallus submembranaceous, stellato-imbricated, of a greenish-strawcolour, often sulphureo-sorediiferous; laciniæ appressed, linear, multifid, convex in the centre, explanate at the circumference, the apices generally incurved; under side black, fibrillose. Apothecia scattered, small, nearly sessile; disc at first concave, afterwards plane, reddish-brown, surrounded by an elevated, subentire, thallodal margin; asci clavate, 8 spored; spores oblongo-obovate, unilocular, hyaline; ·002 in. long, by ·001 in. broad.

Lichen incurvus, Pers.—Sm. E. Bot. 1375.—*Parmelia incurva*, Fries L. Ref. 70.—Hook. Brit. Fl. 2. 202.—Schær. Enum. 47.—Nyl. Enum. Gen. 105.—*Imbricaria incurva*, Kbr. S. L. G. 82.

On rocks, in mountainous districts. Dunkerron! Co. Kerry, *Dr. Taylor.* Teesdale! Durham, *Rev. J. Harriman.*

19. PARMELIA MOUGEOTII, *Schær.* Thallus submembranaceous, orbicular, stellato-imbricated, polished, greenish strawcolour; laciniæ

appressed, closely adherent, subcrustaceous, and sulphureo-sorediiferous in the centre, linear multifid, and explanate towards, and near, the circumference, the apices radiant; under side brownish-black, rugose. "Apothecia very rarely produced; disc reddish-brown, surrounded by a sulphureo-pulverulent, thallodal margin."

Parmelia Mougeotii, Schær. Enum. 46, L. H. 548!—Leight. Exs. 143!—Nyl. Enum. Gen. 105.

On rocks in subalpine districts. Near Aberdeen! *Professor Dickie.* Near Thirsk! *I. G. Baker, Esq.* Ingleby Moor! Battersby Moor! and Hob-hole! Cleveland, Yorkshire. The apothecia are very rarely met with, in fact I believe they have never been observed on British specimens, and according to SCHÆRER, they are very rarely found on the Continent. Its spermogones are not unfrequent, but still they are neither so abundant, nor so common as in many *Parmeliæ.* They are exceedingly minute, punctiform, brownish-black, irregularly and sparingly scattered towards the extremities of the lobes, quite immersed in the substance of the thallus, their apices alone being visible. The sterigmata are short, articulated. The spermatia are numerous, straight, subcylindrico-acicular, ·00125 in. long, by ·00012 broad.

20. PARMELIA DIFFUSA, (*Web.*) Thallus membranaceous, closely adherent, orbicular, stellato-imbricated, sulphureo-sorediiferous, pale yellow or sulphur-coloured; laciniæ appressed, plane, linear, multifid; under side brownish-black, fibrillose. Apothecia sparingly produced, mostly central, slightly elevated; disc plane, reddish-brown, surrounded by a thinnish, entire or subcrenated margin; asci small, obscure; spores oblong, or ovate, unilocular, subhyaline; ·0025 in. long, by ·001 to ·00125 in. broad.

Lichen diffusus, Web. Spic.—*Parmelia ambigua,* Ach. Syn. 208.—Borr. in E. Bot. Suppl. 2796, *two lower fig. only.*—Hook. Brit. Fl. 2. 203, in pt.—Fries L. Ref. 71, in pt.—*P. ambigua, α. diffusa,* Schær. Enum. 47, L. H. 375!—*Imbricaria diffusa,* Kbr. S. L. G. 83—*Squamaria ambigua,* Nyl. Enum. Gen. 111.

On the trunks of trees, dead wood, &c., in alpine districts. Highlands of Scotland! *Sir W. J. Hooker.* Clougha, Lancashire! *Mr. R. Jacob.* Hoggarts' Wood! and Ingleby Greenhow! Cleveland, Yorkshire. This species bears a general resemblance to *P. Mougeotii,* in its external aspect and mode of growth; indeed for a long time I viewed it, simply as a corticole variety of it, but having at length detected the spermogones of both species, I am convinced that they are distinct. The spermogones of the species now under consideration, are usually irregularly, and sparingly scattered, towards the smooth extremities of the laciniæ, especially those which are rather convex; they are extremely minute, and quite immersed in the tissue of the thallus; their presence being indicated on its surface by exceedingly minute brown dots, which are almost, or altogether, invisible to the naked eye. The spermatia are very numerous and beautiful, being much elongated, cylindrical, and curved, at times bent nearly double, at others slightly flexuose, or somewhat vermiform, and at others nearly straight; about ·003 in. long, by ·00012 in. broad.

GENUS 3. BORRERA, (*Ach.*)

Apothecia scutelliform, pedicellate, or sessile, subterminal, or adnate to the lamina of the thallus; disc coloured, surrounded by a thallodal exciple; thalamium thickish, waxy, arising from a simple hypothecium, which is placed upon the medullary stratum; asci clavate, ventricose, or subventricose, each containing 8 spores; spores oblong or elliptical-oblong, often slightly constricted in the middle, bilocular, coloured. Thallus foliaceo-fruticulose, normally ascendant, loosely decumbent, or stellato-appressed; under side more or less fibrillose.

The species constituting the present genus, are distinguished from both the *Parmeliæ*, and *Physciæ*, by their general habit, and the external appearance of their thallus and apothecia, and the internal organization and colour of their spores. The genus *Borrera*, as here defined, will be found to differ much from the original, especially as regards the species now incorporated in it. As defined by the older Lichenologists it could not be said, to be either a well characterised genus or a natural one, as it embraced plants too varied in their habit and appearance; and it is probably on account of this, that no writer of recent date has adopted the genus. I have endeavoured to modify this feature, by excluding some of the most unnatural species, and transposing some others which have been usually associated with *Parmelia, Squamaria*, &c., but which are unquestionably more allied to *Borrera*, and it is hoped by this redistribution, that the genus will neither have been deteriorated in a natural point of view, nor loose any of the interest attached to it, by British Lichenologists, on account of the name it bears.

The genus was originally constituted by ACHARIUS, and dedicated by him to W. BORRER, ESQ., of Henfield, Sussex; who has, in this country, not only been the chief promoter, but for many years the guardian, of Lichenology.

§. 1.—*Thallus normally ascendant, or loosely-decumbent.*

1. BORRERA INTRICATA, (*Desf.*) Thallus subcartilaginous, cæspitose, suberect, very much branched, tomentose, glaucous, or greyish-brown; laciniæ linear, divaricated, and usually much entangled; under side canaliculated, white. Apothecia sparingly produced, lateral, sessile; disc plane, or nearly so, brownish-black, surrounded by a thick, entire, thallodal margin; asci obovato-clavate, 8 spored; spores elliptical-oblong, often slightly constricted in the middle, bilocular, varying in colour from pale-green to dark-olive; ·0045 to ·005 in. long, by ·0025 to ·003 in. broad.

Lichen intricatus, Desf.—*Lichen Atlanticus*, Sm. E. Bot. 1715.—*Borrera Atlantica*, Ach. Syn. 223.—Hook. Brit. Fl. 2. 223.—*Evernia intricata*, Fries. L. Ref. 27.—*Physcia intricata*, Schær. Enum. 11.—Nyl. Enum. Gen. 106.

On the trunks of trees, and on rocks. Cliffs near Hastings! Sussex, *W. Unwin, Esq.* The colour and internal organization of the spores of this species, clearly show that there is no real affinity, neither between it and *Physcia villosa*, Schær., nor *P. flavicaus*, Swartz. It is a well marked species, and cannot easily be confounded with any other in the genus.

2. BORRERA LEUCOMELA, (*L.*) Thallus cartilaginous, subcæspitose, diffuse, lax, laciniated, smooth, glaucous-white; laciniæ very narrow, linear, ascendant, the margins fringed with long black fibres; under side canaliculated, subpulverulent, white. "Apothecia lateral, pedicellate;

disc plane, bluish-black, surrounded by a radiating thallodal margin." Spores. . . . . . ?

Lichen leucomelos, L.—Sm. E. Bot. 2548.—*Borrera leucomela,* Ach. Syn. 222.—Hook. Brit. Fl. 223.—Leight. Exs. 168!—*Parmelia leucomela,* Fries L. Ref. 76.—*Physcia leucomela,* Schær. Enum. Gen. 11.

On the ground among thyme, short grass, etc. Torquay! Devonshire, *Miss M. Atwood.* Ballycotton! Co. Cork, Ireland, *I. Carroll, Esq.* A beautiful species, but one which is rarely seen in a state of fructification. The apothecia have never been observed on British specimens, and apparently they are of rare occurrence on those from other countries; I have had a number of specimens through my hands, from various parts, but always destitute of these fruits. The spermogones, also, are only met with now and then, at least spermatiferous ones. All the spermogones that I have hitherto examined were old, and had shed their spermatia; externally they resembled those of *B. ciliaris,* but were in general smaller in size, and more regular in their outline. The thallus of both this and the following species is at times infested with a very minute parasite, which externally closely resembles spermogones, and, in order to prevent their confusion, I here insert a description of it, under the following (provisional) name.—SPHÆRIA LEUCOMELARIA, *Mudd.* Perithecia very minute, semi-immersed, subspherical, evenly scattered over the alien thallus, or here and there congregated together into groups of two, three, or more, but generally most abundant about the axils of the laciniæ; ostiole slightly depressed, exceedingly minute, discernible by the aid of a Stanhope-lens; nucleus pale, white when wet; paraphyses very slender, capillary; asci elongato-cylindrical, at times slightly inflated in the middle, 4 spored; spores oblong, or obtusely fusiform, quadrilocular, often somewhat constricted opposite the dissepiments, varying in colour from pale-brown to dark-brown; ·007 in. long, by ·002 in. broad.—Parasitic on the thallus of *Borrera leucomela,* and occasionally on *B. ciliaris.*

3 BORRERA CILIARIS, (*L.*) Thallus cartilaginous, diffuse, very much laciniated, subascendant, dull greenish-grey, becoming greyish-brown when much exposed; laciniæ subascendant, linear, often dilated towards their apices, the margins fringed with simple or branched cilia, most abundant near, or at the extremities; under side white, canaliculated. Apothecia large, pedicellate; disc at first concave, becoming plane, brownish-black, pruinose, surrounded by an erect, inflexed, lacerato-dentated, thallodal margin; asci subclavate, 8 spored, spores oblong, more or less constricted in the middle, bilocular, dark olive-green, or dark-brown; ·007 to ·0075 in. long, by ·0035 in. broad.

Lichen ciliaris, L.—Sm. E. Bot. 1352.—*Borrera ciliaris,* Ach. Syn. 220.—Hook. Brit. Fl. 2. 222.—*Parmelia ciliaris,* Fries L. Ref. 77.—*Physcia ciliaris,* Schær. Enum. 10, L. H. 388!—Hepp. Eur. 168!—Nyl. Enum. Gen. 106.—*Anaptychia ciliaris,* Kbr. S. L. G. 50.

β. SAXICOLA, *Nyl.* Thallus small, diffuse, very much laciniated; greyish-green above, white beneath; laciniæ ascending, linear, very narrow, their margins and extremities copiously fringed with long brownish-black cilia. Otherwise as above.

On the trunks of trees; *α.* very common in Great Britain, not found in Ireland. *β.* On rocks, Sybil Head! Co. Kerry, *I. Carroll, Esq.* On rocks near Langbraugh! Cleveland, Yorkshire. This variety only differs from the normal form, by being about half its size. The spermogones, in the ordinary form, are generally very conspicuous, and abundant. They are verrucæform, large, prominent, solitary or confluent, scattered over the face of the laciniæ, or congregated together into irregular groups near their extremities, at first pale brown, afterwards dark-brown, and often nearly black. Spermatia extremely abundant, oblongo-cylindrical, or subellipsoid; ·001 in. long, by ·00016 in. broad. The young, or not fully developed spermogones, contain no free spermatia; those of a dark-brown colour should be examined for them. The blackened spermogones will generally be found to have shed their spermatia.

4. Borrera hispida, (*Dill.*) Thallus subcartilaginous, diffuse, suborbicular, very much laciniated, smooth, grey or greyish-white; laciniæ linear, subpinnatifid, the extremities ascendant, tubuloso-inflated, and as well as the margins fringed with long black or brown cilia; under side white. Apothecia small, sessile; disc plane, brownish-black, pruinose, surrounded by an elevated, entire, thallodal margin; asci subventricose, 8 spored; spores oblong, or ovate, often slightly bent, and at times constricted in the middle, bilocular, olive-green, or brown, each loculus frequently containing a pale circular nucleus in its centre; ·004 in. long, by ·002 in. broad.

Lichen hispidus, Dill.—*Lichen tenellus*, Web.—Sm. E. Bot. 1351.—*Borrera tenella*, Ach. Syn. 221.—Hook. Brit. Fl. 2. 222.—Leight. Exs. 174!—*Parmelia stellaris*, b. *hispida*, Fries L. Ref. 82.—Schær. Enum. 40, and *P. pulchella*, γ. *semipinnata*, Schær. Enum. 41, L. H. 349! and 562!—*P. stellaris*, γ. *adscendens*, Kbr. S. L. G. 85.—*Physcia stellaris*, var. *hispida*, Nyl. Enum. Gen. 107.

β. tenella, (*Scop.*) Thallus ascendant, laciniato-imbricated, glaucous white; laciniæ short, dilated, incurved, the margins more or less lacerated and pulverulent, sparingly ciliated; under side white. Apothecia subsessile; disc plane, brownish-black, surrounded by an entire, or crenulated, thallodal margin. Spores as above.

Lichen tenellus, Scop.—*Parmelia stellaris*, δ. *tenella*, Schær. Enum. 40, L. H. 352!—*Parmelia stellaris*, c. Fries L. Ref. 83.—*Physcia stellaris*, var. *tenella*, Nyl. Enum. Gen. 107.

On the trunks and branches of trees, old walls, rocks, etc.; common. Fries, and others, as will be seen from the synonyms, associate these forms with *Lichen stellaris*. I prefer their separation, and believe that this course is more compatible with nature, than their union. The spermogones are of common occurrence. They are minute, in comparison with those of *B. ciliaris*, but still sufficiently large to be discernible by the eye when unassisted; they are dark-brown, or black, papillæform, semi-immersed, prominent, irregularly scattered, but most numerous on the surface of the dilated apices of the laciniæ. The sterigmata are articulated, and often slightly divided, but always very slender and delicate. The spermatia are frequently very abundant, but never so much so as in *B. ciliaris*, cylindrical, or subellipsoid; ·0005 to ·00075 in. long, by ·00012 to ·0001 in. broad.

§. 2.—*Thallus normally stellato-appressed.*

5. Borrera isidioides, (*Borr.*) Thallus membranaceo-subsquamu-

lose, stellated, smooth, white, or cream-coloured; squamules minute, irregularly and at times distantly scattered, deeply divided and branched into minute cylindrical or slightly compressed segments, which are either decumbent or ascending, simple, or repeatedly divided, the subdivisions often slightly constricted, their apices pale brown. Apothecia minute, not numerous, mostly solitary, slightly elevated; disc plane, dull purple or brownish-black, surrounded by an inflexed, smooth, or crenulated, thallodal margin; asci 8 spored; spores oblong, or elliptical-oblong, bilocular, at times a little constricted in the middle, pale-green, or greenish-olive; ·005 to ·006 in. long, by ·0025 to ·003 in. broad.

Parmelia isidioides, Borr. in E. Bot. Suppl. 2808.

On the mossy trunks of trees; very rare. Crafnant! and Rhaidyr Mowddach! *Rev. T. Salwey.* A minute, but very elegant species, and one which may be readily distinguished from all its allies, by its minute, smooth, squamuloso-isidioid thallus.

6. Borrera speciosa, (*Wulf.*) Thallus membranaceo-cartilaginous, stellated, pinnatifido-laciniated, imbricated, smooth, greenish-white when recent, bluish-white when dry; laciniæ linear, radiating, the apices dilated, obtuse, and eventually sorediiferous; under side white, black-fibrillose. Apothecia of a medium size, sessile, at first coarctate, afterwards explanate; disc plane, reddish-brown, surrounded by an incurved, crenulated, thallodal margin; asci elongato-clavate, 8 spored; spores oblong, at times slightly bent or subreniform, bilocular, olive-green, or brown; ·004 to ·0045 in. long, by ·00175 to ·002 in. broad.

Lichen speciosus, Wulf.—Sm. E. Bot. 1979.—*Parmelia speciosa*, Ach. Lich. Univ. 480.—Fries L. Ref. 80.—Hook. Brit. Fl. 201.—Schær. Enum. 39, L. H. 357!—Tayl. Fl. Hib. pt. 2. 149.—Kbr. S. L. G. 89. —*Physcia speciosa*, Nyl. Enum. Gen. 106.

On the trunks of trees, and on rocks among moss, &c.; very rare. On rocks, Ballacheulish! Scotland, *Sir W. J. Hooker.* Dunkerron! County of Kerry, Ireland, (in fruit), *Dr. Taylor.*

7. Borrera cæsia, (*Hoffm.*) Thallus orbicular, membranaceo-subcartilaginous, stellated, multifido-laciniated, sorediiferous, greyish-white; soredia subglobular, isolated and pretty evenly scattered over the whole thallus, rarely confluent or conglomerated; laciniæ more or less imbricated, convex, short and often subcrustaceous in the centre, generally more elongated towards and at the circumference, the apices dilated; under side pale brown, fibrillose. Apothecia scattered, mostly central, small, sessile; disc plane, glaucous-black, surrounded by an entire, or crenulated, thallodal margin; asci ventricose, 8 spored; spores elliptical-oblong. bilocular, dark-olive; ·004 in. long. by ·002 in. broad.

α. cæsia, (*Hoffm.*)

Lichen cæsius, Hoffm.—Sm. E. Bot. 1052.—*Parmaeli cæsia*, Ach. Syn. 216.—Fries L. Ref. 83.—Kbr. S. L. G. 86.—Leight. Exs. 323!—*Squamaria cæsia*, Hook. Brit. Fl. 2. 196.—*Parmelia pulchella*, *α. cæsia*, Schær. Enum. 41, L. H. 347!—*Physcia cæsia*, Nyl. Enum. Gen. 107.

On walls, stones, roofs of houses. &c.! frequent.

β. tribacia, (*Ach.*) Thallus suborbicular, membranaceo-subcartilaginous, subsquamoso-lobed, closely adherent, sorediiferous, greyish-white; lobes very short, flat, dilated, slightly imbricated, the apices eroso-crenulated; soredia small, subglobose, marginal or terminal; under side pale-brown, sparingly fibrillose, or naked. Apothecia minute, not numerous, scattered, sessile; disc plane, dark-brown, surrounded by an elevated, entire or crenulated, thallodal margin; asci ovate, clavæform, 8 spored; spores elliptical-oblong, bilocular, pale-green, or dark-olive, each loculus frequently containing a pale rounded nucleus in its centre; ·004 in. long, by 002 in. broad.

Lecanora tribacia, Ach. Lich. Univ. 415.—*Squamaria tribacia*, Hook. Brit. Fl. 2. 194, in pt.—*Parmelia cæsia*, c. Fries L. Ref. 84.—*Parmelia tribacea*, Schær. Enum. 39, in pt.

On rocks and stones, old walls, &c. Penzance! and Guernsey, *Rev. T. Salwey*. Near Ayton! Cleveland. Yorkshire.

γ. ALBINEA, (*Ach.*) Thallus membranaceo-cartilaginous, suborbicular, radiating, imbricated and lobed, smooth, greyish-green when recent, cream-coloured when dry; laciniæ dilated, subascendant in the centre, more depressed at the circumference, the apices rounded, eroso-lacerated, and at length pulverulent; under side pale, creamy-white, fibrillose. Apothecia sparingly produced, of a medium size, sessile; disc nearly plane, black, surrounded by an elevated, entire or crenulated, thallodal margin; asci 8 spored; spores elliptical-oblong, bilocular, greenish-olive; ·004 to ·005 in. long, by ·0015 to ·002 in. broad. PLATE 2. *fig.* 31.

Parmelia albinea, Ach. Syn. 207.—*Parmelia erosa*, Borr. in E. Bot. Suppl. 2807.—Leight. Exs. 266!—*Squamaria tribacia*, Hook. Brit. Fl. 2. 194, in pt.—*Parmelia cæsia*, Fries L. Ref. 84, in pt.—*Parmelia tribacia*, Schær. Enum. 39. in pt.—*Physcia stellaris*, var. *albinea*, Nyl. Enum. Gen. 107.

On the trunks of old trees, tiled roofs, and on walls. Lanaber! Barmouth, North Wales, *Rev. T. Salwey*. Near Ayton! Cleveland, Yorkshire. The present and preceding forms, seem to me to be only distinguishable from each other, by the form of the laciniæ of their thallus. Their apothecia and spores, as well as their spermogones and spermatia, bear a general resemblance to each other, in fact these last organs differ very little from those of *B. hispida*, and *B. stellaris*. In *cæsia*, they are minute, and generally imperceptible to the naked eye, and very sparingly produced, at least I have always found them so. In *albinea*, they are minute, but discernible to the eye when unassisted, and usually very numerous. In both forms they are distributed chiefly on the convexities, or dilated apices of the laciniæ; they are black, or brownish-black, papillæform, solitary, nearly immersed, or semi-immersed, prominent; ostiole imperceptible. Spermatia usually abundant, short, cylindrical; ·00075 to ·001 in. long, by ·00012 to ·00016 in. broad.

8. BORRERA ASTROIDEA (*Fries*). Thallus orbicular, membranaceo-cartilaginous, closely adherent, greyish-white; granuloso-crustaceous in the centre; radiato-lobed, and smooth at the circumference; under side white, black-fibrillose. Apothecia sparingly produced, small, innato-sessile; disc at first concave, afterwards plane, brownish-black, cæruleo-pruinose, surrounded by an inflexed, crenulated margin; asci clavate, 8 spored; spores oblong or ovate, bilocular, at times slightly constricted

in the middle, and at others a little bent or subreniform, olive-green, or brown; ·0045 in. long, by ·0015 to ·002 in. broad. PLATE 2. *fig.* 32.

Parmelia astroidea, Fries L. Ref. 81.—Schær. Enum. 40.—Kbr. S. L. G. 81.—*Physcia astroidea,* Nyl. Enum. Gen. 107.

β. CLEMENTI, *(Turn.)* Thallus orbicular, granuloso-pulverulent in the centre; otherwise as above.

Parmelia Clementi, Turn. in Linn. Trans. 9. 146. tab. 13. fig. 1.—Leight. Exs. 324!—*Lichen Clementi,* Sm. E. Bot. 1779.—*Squamaria Clementi,* Hook. Brit. Fl. 2. 196.—*Parmelia astroidea,* b. Fries L. Ref. 81.—*P. astroidea,* β. *Caricæ,* Schær. Enum. 40.

On the trunks of trees, tiled roofs, etc.; but by no means common. Dunkerron! Ireland, *Dr. Taylor.* Twycross! Leicestershire, *Rev. W. A. Leighton.* Penzance! *Rev. T. Salwey.* Near Settle! *Dr. Windsor.* Near Stokesley! Cleveland, Yorkshire.

9. BORRERA STELLARIS, *(L.)* Thallus orbicular, membranaceo-cartilaginous, stellated, glaucous-white; laciniæ sublinear, multifid, radiated; under side white, brownish-black fibrillose. Apothecia of a medium size, very numerous, sessile; disc plane, brownish-black, at first cæsio-pruinose, afterwards naked, or nearly so, surrounded by an entire, inflexed margin; asci ventricose, 8 spored; spores elliptical-oblong, often slightly bent or subreniform, bilocular, each locules frequently containing a pale subcircular nucleus in its centre, dark olive-green, or brown; ·004 in. long, by ·00175 to ·002 in. broad.

Lichen stellaris, L.—Sm. E. Bot. 1697.—*Parmelia stellaris,* Ach. Syn. 216.—Fries L. Ref. 82.—Hook. Brit. Fl. 2. 201.—Schær. Enum. 39, L. H. 350! Leight. Exs. 6!—Kbr. S. L. G. 85.—*Physcia stellaris,* Nyl. Enum. Gen. 107.

On the trunks of trees; very common, and readily recognised by the silver-grey hue of its thallus. The spermogones are of frequent occurrence. They are minute, usually hardly discernible by the eye when unassisted, appearing as extremely minute points; they are distributed, for the most part, over the surface of the convexities and towards the extremities of the laciniæ, papillæform, or subpapillæform, slightly prominent, black, isolated, or congregated together into groups. Sterigmata articulated, very fine and delicate. Spermatia usually abundant, issuing in a long continued stream, cylindrical; ·00075 to ·001 in. long, by ·00012 to ·00016 in. broad.

10. BORRERA OBSCURA, *(Ehrh.)* Thallus submembranaceous, orbicular, closely adherent, stellated, greenish-olive, or olive-brown; laciniæ sublinear, imbricated, flat, or nearly so, inciso-lobed, sorediiferous; soredia mostly marginal, greenish-grey; under side black-fibrillose. Apothecia small, mostly in the centre, sessile; disc plane, brownish-black, surrounded by an entire, inflexed, thallodal margin; asci subventricose, 8 spored; spores oblong, or elliptical-oblong, often slightly bent or subreniform, bilocular, olive-brown, or green; ·004 to ·005 in. long, by ·00175 in. broad.

Lichen obscurus, Ehrh. Crypt. 177.—*Lichen cycloselis,* Ach. Prod. 113.—Sm. E. Bot. 1942.—*Parmelia cycloselis,* Ach. Syn. 216.—Hook. Brit. Fl. 2. 202.—*Parmelia obscura,* α. *orbicularis,* Fries L. Ref. 84.—Leight. Exs. 80!—. *P. obscura,* ε. *cycloselis,* Schær. Enum. 37, L. H. 355!—*Physcia obscura,* Nyl. Enum. Gen. 107, L. P. 33!

β. CHLOANTHA, (*Ach.*) Thallus orbicular, laciniato-lobed, glaucous-green; laciniæ broad, approximated, smooth at the circumference, often granulated in the centre, not sorediiferous. Apothecia large; disc brownish-black, surrounded by an entire, or crenulated margin. Otherwise as above.

Parmelia chloantha, Ach. Syn. 217.—*P. obscura,* var. *chloantha,* Schær. Enum. 37, L. H. 353 !—Kbr. S. L. G. 88.

γ. VIRELLA, (*Ach.*) Thallus stellated, glaucous-green; laciniæ short, laciniato-lobed, obtuse, sorediiferous. Otherwise as above.

Lichen virellus, Ach. Prod. 108.—Sm. E. Bot. 1696.—*Parmelia virella,* Ach. Meth.—Hook. Brit. Fl. 2. 202.—*P. ulothrix,* Tayl. Fl. Hib. pt. 2. 146.—*P. obscura,* var. *virella,* Schær. Enum. 37.

δ. ULOTHRIX (*Fries*). Laciniæ linear, subciliated. Apothecia of a medium size; the margin more or less ciliato-radiated. Otherwise as above.

Parmelia obscura, β. ulothrix, Fries L. Ref. 85.—*P. obscura,* var. *ciliata,* Schær. Enum. 37.

ε. ADGLUTINATA, (*Flork.*) Thallus orbicular, imbricato-stellated, dark greenish-olive; laciniæ very narrow, closely adherent and multifid at the circumference; subcrustaceous and pulverulent in the centre. Apothecia minute, mostly in the centre; disc plane, brownish-black, surrounded by an entire margin. Otherwise as above.

Lecanora adglutinata, Flk.—*Parmelia obscura,* var. *adglutinata,* Schær. Enum. 37.—*Physcia obscura,* var. *adglutinata,* Nyl. Enum. Gen. 107, L. P. 34 !—*Lobaria obscura,* var. *adglutinata,* Hepp. Eur. 374 !—*Lichen elæinus,* Sm. E. Bot. 2158.—*Squamaria elæina,* Hook. Brit. Fl. 2. 197.—*Parmelia adglutinata,* Tayl. Fl. Hib. pt. 2. 146.

On the trunks and branches of trees, old pales, rocks, walls, etc.; all more or less common. The spermogones are, generally speaking, not of frequent occurrence. They are minute, distinct and visible to the naked eye when moist, pale-brown, or olive-brown, papillæform, prominent, irregularly scattered over the face of the thallus, but most abundant about the apices of the laciniæ. The spermatia are exceedingly numerous, issuing in a dense cloud, rather variable in their outline, at times subcylindrical, at other ellipsoid, and at others ovate; ·0005 to ·00075 in. long, by ·00016 to ·00025 in. broad.

11. BORRERA PULVERULENTA, (*Schreb.*) Thallus membranaceo-cartilaginous, substellated, multifido-laciniated, greenish, or greyish-brown, cæsio-pruinose; under side black, densely fibrillose, pannose. Apothecia large, numerous, sessile; disc somewhat concave, or plane, brownish-black, cæsio-pruinose, surrounded by a thick, inflexed, crenulated, thallodal margin; asci elongato-clavate, 8-spored; spores elliptical oblong, bilocular, at times slightly bent, subreniform, and at others slightly constricted in the middle, dark olive-green, or brown; ·006 to ·007 in. long, by ·003 to ·0035 in. broad.

Lichen pulverulentus, Schreb.—Sm. E. Bot. 2063.—*Parmelia pulverulenta,* Ach. Syn. 214.—Hook. Brit. Fl. 2. 201.—Fries L. Ref. 79.—Tayl. Fl. Hib. pt. 2. 141.—Schær. Enum. 38, L. H. 356 !—Leight. Exs. 49 !—Kbr. S. L. G. 86.—*Physcia pulverulenta,* Nyl. Enum. Gen. 107.

β. ANGUSTATA, (*Hoffm.*) Laciniæ narrow, linear elongated, deeply divided and separated, subpinnate. Otherwise as above.

Lichen angustatus, Hoffm.—*Parmelia pulverulenta,* b. *muscigena,* and *β. angustata,* Schær. Enum. 38.

γ. GRISEA, (*Lam.*) Thallus membranaceous, orbicular, imbricato-laciniated, pale glaucous-green; laciniæ dilated, concave, rounded, crenate, the lateral margins granulato-pulverulent; underside pale, sparingly fibrillose. Apothecia rarely produced, small; disc brownish-black, cæsio-pruinose, surrounded by an incurved, pulverulent, thallodal margin. Otherwise as above.

Lichens griseus, Lam. (fide Schær.)—*Lichens pityreus*, Ach. Prod.—Sm. E. Bot. 2064.—*Parmelia pityrea*, Ach. Syn. 201.—Hook. Brit. Fl. 2. 201.— *P. pulverulenta*, var. Fries. L. Ref. 79.—*P. pulverulenta, γ. grisea*, Schær. Enum. 38, L. H. 487 !—Kbr. S. L. G. 87.

On the trunks and branches of trees, and on old walls, over-running mosses, &c.; common almost everywhere, especially the normal form. The spermogones are rather rare, in comparison with the commonness of the species. They are minute, visible to the eye when moist as extremely minute points, papillæform, or subverrucæform, prominent, brown, often covered with white pruina similar to the apothecia, solitary, or congregated together in groups, and often confluent, usually seated on the convexities of the thallus, or about the extremities of the laciniæ. Spermatia exceedingly numerous, generally cylindrical; ·001 to ·000112 in. long, by ·00016 in. broad.

12. BORRERA AQUILA, (*Ach.*) Thallus suborbicular, cartilaginous, somewhat stellato-lobed, imbricated, smooth, tawny-brown; laciniæ narrow, linear, repeatedly divided and laciniated, convex in the centre, the margins inflexed, explanate at the circumference; under side pale, black-fibrillose. Apothecia rather large, adnato-sessile; disc slightly concave, or plane, dark-brown, or nearly black, surrounded by a thin, tumid, incurved, subcrenulated, thallodal margin; asci saccate, 8 spored; spores oblong, slightly constricted in the middle, bilocular, dark-brown; ·007 in. long, by ·0035 in. broad.

Lichen aquilus, Ach. Prod.—Sm. E. Bot. 982.—*Parmelia aquila*, Ach. Syn. 205.—Fries L. Ref. 78.—Hook. Brit. Fl. 2. 203.—Tayl. Fl. Hib. pt. 2. 143.—Schær. Enum. 49, L. H. 565 !—Leight. Exs. 144 !—Kbr. S. L. G. 89.—*Physcia aquila*, Nyl. Enum. Gen. 107.

On exposed rocks, at various altitudes; not common. Moncrieff Hill! near Perth, *Dr. Lindsay*. Torquay! Devonshire, ex. herb., *Rev. W. A. Leighton*. Near Ardglass! county Down, Ireland; and near Montrose! Scotland, *Dr. Maingay*. Near Aberfeldy! Perthshire, *Rev. H. Macmillan*. The spermogones are usually present, but imperceptible to the naked eye, on account of the dark colour of the thallus. They are minute, papillæform, or subpapillæform, more or less prominent, dark-brown or black, chiefly scattered over the face of the convexities, or about the ends of the laciniæ, either solitary, or grouped and distinct, or confluent and irregular. The sterigmata are articulated, rather short and delicate. The spermatia occur in myriads, forming a dense cloud when first ejected from the spermogonic cavity; they are cylindrical, straight, ·00075 to ·001 in. long, by ·00016 to ·0002 in. broad.

GENUS 4. PHYSCIA. (*Schreb.*)

Apothecia scutelliform, subpedicellate, or sessile, adnate to the superior surface of the thallus; disc mostly orange-coloured, margined by a thallodal exciple; thalamium thin, arising from a rather thick, simple hypothecium, which is seated upon the gonidiac stratum; asci oblongo-subventricose, attenuated at the base, each containing 8 or 24 spores; spores elliptical-oblong, polari-bilocular, uncoloured. Thallus normally subfruticuloso-filamentose, foliaceo-imbricated, or squamulose, usually of a greenish-yellow, or orange-colour; under side obsoletely fibrillose.

All the species constituting the preceding genus, and those of the present one, are united together by Dr. Nylander; and are, by him, simply divided into sections, founded on the colour of their thallus and spores. This union appears to me to be extremely unnatural, and their reputed alliance more imaginary than real. The spores alone of the different species in the two groups clearly indicate, that, however great the general external resemblance may be, they are truly distinct, their construction and colour being totally different.

1. Physcia flavicans, (*Swartz.*) Thallus subcartilaginous, cæspitose, much branched and lacerated, entangled, yellow, or orange-yellow; laciniæ divaricated, roundly-compressed, linear, sorediiferous; the apices subfilamentose, attenuated; concolorous on both sides. Apothecia lateral, small, subsessile; disc plane, orange-coloured, surrounded by an entire, paler, thallodal margin; asci 8 spored; spores elliptical-oblong, polari-bilocular, hyaline, or subhyaline; ·0025 in. long, by ·001 to ·00125 in. broad. Plate 2. *fig.* 33.

Lichen flavicans, Swartz.—Sm. E. Bot. 2113.—*Borrera flavicans*, Ach. Syn. 224.—Hook. Brit. Fl. 2. 224.—Leight. Exs. 169!—*Evernia flavicans*, Fries L. Ref. 28.—*Parmelia flavicans*, Tayl. Fl. Hib. pt. 2. 147.—*Cornicularia flavicans*, Schær. Enum. 6, L. H. 552!—*Physcia flavicans*, Nyl. Enum. Gen. 106.

G4

On the trunks and branches of trees and shrubs. and occasionally on rocks and stones. Near Lewes! Sussex, *W. Unwin*, Esq. Ardglass! County Down, Ireland. *Dr. Maingay*. Penzance! (in fruit!), Cornwall, *Rev. T. Salwey*. Near Settle! Yorkshire, *Dr. Windsor*.

2. Physcia chrysophthalma. (*L.*) Thallus cartilagineo-membranaceous, cæspitoso-subfoliaceous, branched and lacerated, bright greenish-yellow, becoming whitish; laciniæ linear, depresso-subascendant, multifid, plane, or convex, the margins and extremities more or less fibrilloso-fringed; under side pale. Apothecia rather large, subterminal; disc concave, becoming nearly plane, orange-coloured, surrounded by an elegant fibrilloso-ciliated thallodal margin; asci narrow, oblongo-clavate, 8 spored; spores elliptical-oblong, polari-bilocular, hyaline; ·003 to ·0035 in. long, by ·00125 in. broad. Plate 2. *fig.* 34.

Lichen chrysophthalmus, L.—Sm. E. Bot. 1088.—*Borrera chrysophthalma*, Ach. Syn. 224.—Hook. Brit. Fl. 2. 223.—*Parmelia chrysophthalma*, Fries L. Ref. 75.—*Physcia chrysophthalma*, Schær. Enum. 12, L. H. 389!—Nyl. Enum. Gen. 106.

β. Dickieana, (*Linds.*) Thallus small, glaucous-white. Apothecia of a medium size; disc nearly plane, yellowish-orange, surrounded by a smooth, naked, entire, thallodal margin. Otherwise as above.

Physcia villosa, var. *Dickieana*, Linds. Mem. Sperma. 254.

On the branches of trees chiefly in the South. Near Lewes! Sussex, *W. Unwin, Esq.* Near Cork! Ireland, *I. Carroll*, *Esq.* Near Settle! Yorkshire, *Dr. Windsor*. β. On rocks, &c. Cave Hill! Belfast, *Professor Dickie;* and near Newcastle! Co. Down, Ireland, *I. Carroll, Esq.* The variety *Dickieana*, is regarded by Dr. Lindsay as more allied to *P. villosa* (a species not found in this country), than to the present. I regret that I cannot subscribe to this view. *P. villosa* is a very different plant; its thallus being much larger and more robust, than that of *chrysophthalma*, as well as being densely villose, and never fibrilloso-fringed at the margins. All the specimens of *Dickieana*, that I have seen, possess opposite characters; its thallus is much smaller than the ordinary form of *chrysophthalma*, not villose, the margins and apices copiously fringed with long white fibres. From these characters I infer that the present is its proper place. The spermogones are rendered conspicuous in this variety from their contrast of colour to the thallus. They are minute, orange-coloured, visible to the naked eye, tuberculiform, prominent, generally solitary, and scattered towards the extremities of the laciniæ. The spermatia are exceedingly numerous, issuing in a dense greyish cloud, ellipsoid, or subcylindrical, very short, ·00025 to ·0005 in. long, by ·00016 to ·0002 in. broad.

3. PHYSCIA PARIETINA, (*L.*) Thallus suborbicular, membranaceous, imbricato-lobed, greenish-yellow, or orange; lobes explanate, appressed, rounded, and somewhat crenate at the circumference; often rugoso-verrucose in the centre; underside paler, obsoletely fibrillose. Apothecia small, elevato-sessile, usually numerous; disc from concave becoming plane, orange-coloured, surrounded by an entire, elevated, thallodal margin; asci subclavæform, or oblongo-subventricose, 8 spored; spores oblong, or elliptical, polari-bilocular, hyaline; ·0025 in. long, by ·001 to ·00125 in. broad.

α. PARIETINA, (*L.*)

Lichen parietinus, L. Sm. E. Bot. 194.—*Parmelia parietina*, Ach. Syn. 200.—Fries L. Ref. 72.—Hook. Brit. Fl. 2. 204.—Tayl. Fl. Hib. pt. 2. 141.—Schær. Enum. 49, L. H. 380!—Leight. Exs. 10!—Kbr. S. L. G. 91.—*Physcia parietina*, Nyl. Enum. Gen. 106.

β. AUREOLA, (*Ach.*) Thallus orbicular, orange-coloured, or golden-yellow; lobes rounded, plane or concave at the circumference, crowded and more or less granulato-verrucose in the centre. Apothecia of a medium size; disc plane, orange-coloured, surrounded by an entire, or crenulated margin.

Parmelia aureola, Ach. Univ. 487.—*P. parietina*, *β. aureola*, Fries L. Ref. 73.—Schær. Enum. 49.

γ. ECTANEA, (*Ach.*) Thallus foliaceous, stellated, laciniato-lobed, yellowish-orange; laciniæ narrow imbricated, repeatedly divided.

Fries. L. Ref. 73.—Schær. Enum. 50.

δ. LACINOSA, (*Duf.*) Thallus squamulose, deep-yellow, lacerato-dissected; laciniæ ascending, naked. Apothecia minute, often crowded, nearly concolorous with the thallus.

Fries L. Ref. 73.—Schær. Enum. 51, L. H. 381!

ε. LOBULATA, (*Flk.*) Thallus yellowish-orange; lobes dispersed, very short, scattered, rotundato-crenate, naked. Apothecia minute, numerous.

Lecanora lobulata, Flk. D. L. 14.—*Par. parietina*, var. *lobulata*, Fries L. Ref. 73.—Schær. Enum. 50.

ζ. POLYCARPA, (*Ehrh.*) Thallus orbicular, conglomerated, greenish-yellow; lobes complicated, sublaciniated, naked. Apothecia of a medium size, numerous and crowded.

Lichen polycarpus, Ehrh. Crypt. 136.—Sm. E. Bot. 1795.—*Squam-*

aria candelaria, β. Hook. Brit. Fl. 2. 194. —*Par. parietina*, var. *polycarpa*, Fries L. Ref. 73.—Leight. Exs. 265 !

μ. LYCHNEA, (*Ach.*) Thallus orbicular, pulvinate, deep-yellow, lobed, or lacerato-dissected, granuloso-pulverulent.

Parmelia candelaria, var. *lychnea*, Ach. Meth. 187.—Schær. Enum. 50, L. H. 549 !

φ. CONCOLOR. (*Dicks.*) Thallus squamulose, lacerato-laciniated, greenish-yellow ; squamules crowded, ascendant, pulverulent.

Lichen concolor, Dicks.—*Par. parietina*, var. *concolor*, Fries L. Ref. 73.—Leight. Exs. 12 !

ι. CITRINELLA, *Fries*. The whole thallus dissolved into powder, greenish-yellow.—Fries L. Ref. 73.

κ. VIRIDIS. (*Schreb.*) Thallus granuloso-pulverulent, dark-green when wet, paler when dry.

Lichen viridis, Schreb.—Sm. E. Bot. 2148.—*Lepraria viridis*, Hook. Brit. Fl. 2. 163.—Leight. Exs, 350 !

On the trunks and branches of trees, old pales, walls, rocks, roofs of houses &c. ; generally distributed. The whole of the varieties, here enumerated, pass in gradual transition from one to another, and are more or less connected by intermediate states. The spermogones are not of very frequent occurrence in the superior form, but plentiful in some of the inferior, especially *lacinosa*, *lobulata*, and *polycarpa*. In general they are minute and quite imperceptible to the eye when unassisted, orange-coloured, or yellowish-orange, but always of a deeper colour than the thallus. They are papillæform, or subtuberculiform, mostly congregated in groups of two or three, but occasionally solitary, usually scattered towards the extremities of the laciniæ in the normal form, placed on, or near the apices of the ascendant lobules in the varieties. The sterigmata are very delicate and undefinable, further than a grey mass of tissue. The spermatia are always extremely minute, and generally abundant, ellipsoid, or subcylindrical ; ·00025 to ·0005 in. long. by ·00012 to ·00016 in. broad.

4. PHYSCIA CANDELARIA, (*L.*) Thallus membranaceous, foliaceo-squamulose, substellated, greenish-yellow ; scales minute, lacerato-laciniated, subascendant, the margins curled, crisped, and more or less granuloso-pulverulent. Apothecia minute, subsessile ; disc subconcave, brownish-yellow, surrounded by an inflexed, somewhat granulose, or naked, thallodal margin ; asci subclavato-ventricose, each containing from 24 to 32 spores ; spores elliptical-oblong, polari-bilocular, or subpolari-bilocular, hyaline ; ·002 in long, by ·001 in. broad.

Lichen candelarius, L.—Sm. E. Bot. 1794.—*Lecanora candelaria*, Ach. Syn. 191.—*Parmelia parietina*, var. Fries L. Ref. 73.—Schær. Enum. 51, L. H. 382 !—*Squamaria candelaria*, Hook. Brit. Fl. 2. 194. *Candelaria vulgaris*, Kbr. S. L. G. 120.—*Physcia candelaria*, Nyl. Enum. Gen. 106.

On the trunks of old trees, pales, rocks, etc. ; not common. On trees, near Cork ! Ireland, *I. Carroll, Esq.* Bolton Woods ! *Dr. Carrington.* This species closely resembles some of the varieties of *P. parietina*, but is distinguished from them, by the number of spores in each ascus.

TRIBE 5. UMBILICARIACEÆ, (*Fée.*)

Thallus horizontal, foliaceous, coriaceo-cartilaginous, monophyllous, or polyphyllous, affixed to the basis of attachment by a central point; upper surface smooth, pustulate, or granulato-corrugated; under surface smooth, granulated, reticulato-lacunose, papillose, or fibrous; margins naked, or fibrilloso-fringed. Hypothallus none. Apothecia erumpent from the disc of the thallus, sessile, pseudo-patellæform, simple, or compound, margined by a thallodal exciple, which becomes converted into a proper exciple.

GENUS 1. UMBILICARIA, (*Hoffm.*)

Apothecia at first closed, tuberculiform, afterwards open, pseudo-patellæform, simple, superficial, black, margined by a subcompound exciple, (internal, pale, formed from the cortical stratum; external, black, very thin, subcarbonaceous); thalamium arising from a brownish-black, simple hypothecium, which is placed upon the medullary stratum; paraphyses pale hyaline, filiform; asci short, oblongo-saccate, each containing one spore; spores oblong, or elliptical, reticulato-plurilocular, pale yellowish-brown. Thallus coriaceous, monophyllous, fuligineo-flocculose; under side naked, reticulato-lacunose.

1. UMBILICARIA PUSTULATA, *Hoffm.* Thallus coriaceous, horizontal, monophyllous, papillose, inciso-lobed at the circumference, pale olive-green or grey, with large fuliginoso-flocculose glomeruli irregularly scattered over the surface; under side brown, reticulato-lacunose, naked. Apothecia very rarely produced, of a medium size, scattered among the glomeruli, sessile; disc at first concave, afterwards plane, or convex, rugose, black, surrounded by a thick, rugged, black margin, which eventually becomes obliterated as the disc arrives at maturity; paraphyses lax, filiform, pale; asci short, oblongo-saccate, each containing one spore; hypothecium rather thick, brownish-black; spores elliptical, or oblong, reticulato-plurilocular, pale yellowish-brown; ·007 to ·01 in. long, by ·005 to ·007 in. broad. PLATE 2: *fig.* 35.

Rock under the Guardhouse [illegible]

Umbilicaria pustulata, Hoffm.—Fries L. Ref. 350.—Hook. Brit. Fl. 2. 219.—Schær. Enum. 25, L. H. 156!—Leight. Exs. 166!—Brit. Umbi. 22.—Kbr. S. L. G. 93.—Nyl. Enum. Gen. 107.—*Lichen pustulatus*, L.—Sm. E. Bot 1283.—*Macrodictya pustulata*, Massal. Ric. 59. fig. 109.

On rocks in alpine districts. Glengariff! (in fruit,) Ireland, *Miss Hutchins.* Caer Caradoc! Shropshire, *Rev. W. A. Leighton.* Road-side, between Portree and Sligachan! Skye, *Dr. Lindsay.* Blackstone Rock! Devonshire, *Mr. E. Parfitt.* Great Malvern! *Miss M. Atwood.* Great Sugar Loaf Mountain! *Mr. R. Jacob.* The spermogones are tolerably abundant on the specimen from this last named locality, otherwise I have found them to be rather sparingly produced. They are small, visible to the naked eye, but not distinguishable from the young glomeruli without the aid of a good lens, black, papillæform, very prominent, almost superficial, solitary, usually irregularly scattered over the pustules, or about the margins of the thallus; ostiole generally perceptible, regular; sterigmata articulated; spermatia abundant, short, cylindrical, ·001 in. long, by ·00016 to ·0002 in. broad.

GENUS 2. GYROPHORA, (*Ach.*)

Apothecia black, superficial, pseudo-patellæform, simple, or compound, consisting of numerous gyroso-plicate apothecia aggregated together, each margined by a thallodal exciple, which becomes converted into a black proper exciple; thalamium yellowish-brown, arising from a brown, or brownish-black simple hypothecium; asci clavate, oblongo-clavate, or clavato-ventricose, each containing 8 spores; spores oblong, elliptical, or elliptical-oblong, unilocular, subhyaline, or hyaline. Thallus foliaceous, submonophyllous, or polyphyllous, imbricato-lobed; upper surface smooth, pustulate, or granulato-corrugated; under surface smooth, granulated, reticulato-lacunose, or fibrous.

The whole of the species constituting the present genus, are regarded and classified by the REV. W. A. LEIGHTON as states of one variable species. I prefer their separation, and believe it to be the most natural, as the specific differences are equally as strong and permanent here, as in several other genera.

1. GYROPHORA POLYPHYLLA, *(L.)* Thallus coriaceo-cartilaginous, unequally lobed; lobes more or less imbricated, the margins erect or reflexed, smooth, or slightly corrugated, greenish copper-colour when moist, brownish-black when dry; under side black, naked. Apothecia black, sessile, at first subpatellæform, plane, margined, becoming at length convex, and somewhat concentrically plicate; asci clavæform, 8 spored; spores elliptical-oblong, unilocular, internally subgranular, hyaline, or subhyaline; ·003 to ·0035 in. long, by ·001 to ·0015 in. broad. PLATE 2. *fig.* 36.

Lichen polyphyllus, L.—Sm. E. Bot. 1282.—*Umbilicaria polyphylla.* Fries L. Ref. 352.—Nyl. Enum. Gen. 107.—*Gyrophora polyphylla,* Hook. Brit. Fl. 2. 217.—Schær. Enum. 28, L. H. 149!—Kbr. S. L. G. 95.—*U. varia, α. polyphylla,* a. b. and c. Leight. Brit. Umb. 6. 7, Exs. 65! and 313!

b. LACERA, *(Leight.)* Thallus very deeply divided; divisions lacero-lobate. *U. varia,* d. *lacera,* Leight. Brit. Umb. 8.

β. FLOCCULOSO, *(Wulf.)* Thallus membranaceo-cartilaginous, monophyllous, or imbricato-lobed, the margins curled and reflexed; upper surface furfuraceo-flocculose, rusty-brown, or nearly black; under surface naked, impresso-punctate, or lacunose, black. Apothecia rarely produced, sessile, plane, circinato-proliferous, at length convex, gyrose. Spores as above.

Lichen flocculosus, Wulf.—*Gyrophora deusta,* Ach. Meth. 102.—Sm. E. Bot. 2483.—Hook. Brit. Fl. 2. 218.—*U. polyphylla,* c. *deusta,* Fries L. Ref. 352.—Nyl. Enum. Gen. 107.—*U. polyphylla, β. flocculosa,* Schær. Enum. 28, L. H. 152!—*Gryophora flocculosa,* Kbr. S. L. G. 95. —*U. varia, β.* a. b. c. and d. Leight. Brit. Umb. 8. 9, Exs. 219!

On rocks in mountainous districts. *α.* Birnam Hill! Craig-y-Barns! Dunkeld! and Glen Dee! *Dr. Lindsay.* Near Todmorden! and on Ingleborough! *Dr. Carrington.* Aviemore! and Ben Nevis! (with apothecia,) *Admiral Jones.* Swinhope Fell! Durham Ingleby moor! Kildale Moor! and Howden Gill! Cleveland, Yorkshire. *β.* Eglestone! Durham, *Rev. J. Harriman.* Caer Caradoc! Shropshire, *Rev. W. A. Leighton.* The spermogones are not of uncommon occurrence. They are minute, invisible to the naked eye, papillæform, prominent, concolorous with the thallus, isolated, indiscriminately scattered over the whole face of the thallus. The spermatia are not so numerous as in many species, but still they are plentiful. They are short, cylindrical, ·001 in. long, by ·00016 in. broad.

2. GYROPHORA HYPERBOREA, (*Ach.*) Thallus coriaceo-membranaceous, monophyllous, the margins irregularly erose, laciniato-lobed, and slightly perforated, naked on both sides, the upper one, rugoso-papulose, olive-brown; the under one, smooth, sublacunose, blackish-brown. Apothecia appressed, sessile, at first simple, elliptical, lirellæform, at length parallel-proliferous, or variously gyrose; asci oblongo-clavate, 8 spored; spores elliptical, or elliptical-oblong, unilocular, subhyaline; ·003 in. long, by ·0015 in. broad.

Lichen hyperboreus, Ach. Prod.—*Gyrophora hyperborea*, Ach. Meth. 104.—Kbr. S. L. G. 95.—Hepp. Eur. 116!—*Umbilicaria hyperborea*, Fries L. Ref. 353.—Massal. Ric. 63. fig. 117.—Nyl. Enum. Gen. 107. —*U. polyphylla*, γ. *hyperborea*, Schær. Enum. 29, L. H. 150! 151!—*U. varia*, γ. Leight. Brit. Umbi. 10.

β. ARCTICA, (*Ach.*) Thallus coriaceous, monophyllous, slightly lobed, the margins irregularly crenate; lobes rounded and somewhat reflexed, naked on both sides; upper surface rugoso-verrucose, greyish, dark-brown, or nearly black; under, nearly smooth, blackish-brown. Apothecia sessile, at first simple, orbicular, varying to angular and subreniform, at length more or less confluent and aggregated together into irregular groups. Asci and spores as above.

Gyrophora arctica, Ach. Meth. 106.—Sm. E. Bot. 2485.—*Gyrophora proboscidea*, β. *arctica*, Hook. Brit. Fl. 2. 217.—*Umbilicaria polymorpha*, γ. *arctica*, Schær. Enum. 27, L. H. 556; *U. varia*, δ. Leight. Brit. Umbi. 11.— *U. hyperborea*, β. Nyl. Enum. Gen. 107.

On rocks in alpine districts. α.—Invercauld! *Admiral Jones.* Clougha! Lancashire. *Mr. R. Jacob.* Ben Nevis! Lochaber. Morchone! and Ben Mac-Dhui! Braemar. β.—Lochnagar! *Dr. Lindsay.* Both these forms are distinguished from *polyphylla*, by the uneven papulose and undulated surface of their thallus, and by their larger and much more abundant apothecia; and from *erosa*, their nearest ally, by the papulose upper surface, and by the naked under surface of their thallus.

3. GYROPHORA EROSA, (*Weber.*) Thallus coriaceo-membranaceous, thickish, monophyllous, irregularly lobed, lacerated and reticulato-perforated; upper side rugulose, rimoso-subareolate, olive-brown, or brownish-black; under side rugoso-papillose, fibrous, brown, or brownish-black. Apothecia appressed, sessile, at first simple, plane, margined; afterwards aggregated together into irregular gyrose groups or masses; asci oblongo-subclavate, 8 spored; spores elliptical, unilocular, subhyaline, or hyaline; ·003 in. long, by ·0015 in. broad.

Lichen erosus, Weber.—*Gyrophora erosa*, *A*ch. Syn. 65.—Sm. E. Bot. 2066.—Hook. Brit. Fl. 2. 218.—Kbr. S. L. G. 96.—*Umbilicaria erosa*, Fries L. Ref. 354.—Schær. Enum. 29, L. H. 153!—Massal. Ric 62, fig. 116.—Nyl. Enum. Gen. 108.—*U. varia*, var *erosa*, Leight. Brit. Umbi. 12.

On rocks in alpine districts. Aviemore! *Admiral Jones.* Lochnagar! *Dr. Lindsay.* Ben Lawers! *Dr. Maingay.* Stansfield Moor! near Halifax, *W. Brunton, Esq.* Swinhope Fell! Co. Durham. The spermogones are of common occurrence. They are minute, but visible to the naked eye, on account of their large patent ostioles, when moist, invisible when dry, scattered indiscriminately over the superior face of the whole thallus of specimens destitute of apothecia, but principally about the margins of apotheciaferous ones, papillæform, semi-immersed, or immersed, solitary. The ostiole is generally distinct, rounded or subangular, large and patent when old, and somewhat resembling very young apothecia. The spermatia are of the ordinary form, short, cylindrical, ·00075 to ·001 in. long, by ·00016 in. broad.

4. Gyrophora proboscidea, (*Ach.*) Thallus submembranaceous, monophyllous, orbicular, the margins crenate and sometimes slightly lobed, naked on both sides; the upper one, rugoso-reticulated, olive-brown, becoming greyish-black; the under, naked, smooth, greyish-brown. Apothecia numerous, sessile, at first orbicular, varying to angular and reniform, margined; afterwards irregularly gyroso-proliferous; asci subclavate, 8 spored; spores elliptical-oblong, unilocular, subhyaline, or hyaline; ·0035 to ·004 in. long, by ·0015 to ·00175 in. broad.

Lichen proboscideus, Ach. Prod. 147.—*Gyrophora proboscidea*, Ach. L. Univ. 220.—Sm. E. Bot. 2484.—Hook. Brit. Fl. 2. 217.—Kbr. S. L. G. 96.—*Umbilicaria proboscidea*, Fries L. Ref. 354.—Nyl. Enum. Gen. 108.—*U. polmorpha β. deusta*, Schær. Enum. 26, L. H. 148 !—*U. varia*, var. *deusta*, Leight. Brit. Umbi. 17.

b. fimbriata, (*Turn.* et *Borr.*) Thallus as above, except the margins and under side, which are sparingly fibrous.

Gyrophora deusta, *β. fimbriata*, Turn. & Borr. Lich. Brit. 222.—*U. varia*, var. *deusta*, subvar. *fimbriata*, Leight. Brit. Umbi. 18.

c. corrugata, (*Hoffm.*) Thallus thin, reticulato-rugose; reticulations elevated. Otherwise as in the normal form.

Umbilicaria corrugata, Hoffm.—Massal. Ric. 61. fig. 113.—*Gyrophora proboscidea*, *β. exasperata*, Ach. Meth. 105.—*U. varia*, var. *deusta*, subvar. *corrugata*, Leight. Brit. Umbi. 18.

d. mesenteriformis, (*Wulf.*) Thallus thickish, the upper side reticulato-rugose, and somewhat papillose.

Lichen mesenteriformis, Wulf.—*U. varia*, var. *deusta*, subvar. *mesenteriformis*, Leight. Brit. Umbi. 19.

On rocks in alpine districts. Aviemore! *Admiral Jones*. Ben Nevis! Lochnagar! and road-side walls, between Spittal of Glenshee and Braemar! *Dr. Lindsay*. Brandon Mountains! Kerry, *D. Moore, Esq.* Swinhope Fell! County Durham. The spermogones are, apparently, not of very common occurrence. On specimens of the variety *fimbriata*, collected by myself on Swinhope Fell, in the county of Durham, they occur in great profusion, otherwise I have never met with them in my examinations. On specimens from this last locality, they are numerously scattered over the superior face of the thallus, but most profuse towards the periphery. After the thallus has been moistened with water, they are visible to the naked eye as minute slightly elevated papillæ. The ostioles are in general distinct, and easily seen with the aid of a common lens, in fact it is chiefly on this account that the spermogones are here recognisable from young apothecia without recourse to dissection, by age they become irregular in their outline, enlarged, and patent. The spermatia differ in nothing from those of the last species, but size, being full ·001 to ·00116 in. long, by ·00016 in. broad.

5. Gyrophora cylindrica, (*L.*) Thallus subcoriaceous, monophyllous, or polyphyllous, sinuato-lobed; lobes imbricated unequal, the

margins fringed with black branched fibres; upper side rugulose, dull greenish-brown when moist, smoky-grey and somewhat pruinose when dry; under side greyish-brown, naked about the central parts, more or less fibrous towards the circumference. Apothecia at first sessile, orbicular, or nearly so, plane, margined; afterwards pedicellate, concentrically gyrose, convex, or subglobose; asci clavate, 8 spored; spores elliptical, unilocular, filled with a finely granular protoplasm, subhyaline, or hyaline; ·003 in. long, by ·0015 in. broad.

Lichen cylindricus, L.—Ach. Prod. 148.—*Lichen proboscideus,* Sm. E. Bot. 522, two upper figs.—*Gryophora cylindrica,* Ach. L. Univ. 223. —Hook. Brit. Fl. 2. 218.—Kbr. S. L. G. 97.—*Umbilicaria proboscidea, β. cylindrica,* Fries L. Ref. 356.—*U. polymorpha,* a. *cylindrica;* and d. *fimbriata,* Schær. Enum. 26, L. H. 143! and 146!—*U. crinita,* Massal. Ric. 61. fig. 111.—*U. cylindrica,* Nyl. Enum. Gen. 108.—*U. varia,* var. *proboscidea,* Leight. Brit. Umbi. 19, Exs. 95!

b. DENTICULATA, (*Ach.*) Margins of the thallus coarsely fringed and denticulated.

Gyrophora cylindrica, β. denticulata, Ach. Meth. 107.—*Lichen proboscideus,* Sm. E. Bot. 522, two lower figs.—*U. polymorpha,* b. Schær. Enum. 26, L. H. 144!—*U. varia* var. *proboscidea,* subvar. *denticulata,* Leight. Brit. Umbi. 21.

c. DENUDATA, *Turn* and *Borr.*) Thallus monophyllous, the margins naked, or nearly so.

Gyrophora proboscidea, γ. denudata, Turn. and Borr. Lich. Brit. 219. —*U. polymorpha,* c. *nudiuscula,* Schær. Enum. 26, L. H. 145!—*U. varia,* var. *proboscidea,* subvar. *denudata,* Leight. Brit. Umbi. 21.

d. EXASPERATA, (*Turn* and *Borr.*) Thallus polyphyllous, upper side rugose, the margins curled and undulated.

Gyrophora proboscidea, δ. exasperata, Turn. and Borr. Lich. Brit. 219. —*U. varia,* var. *proboscidea,* subvar. *exasperata,* Leight. Brit. Umbi. 22.

On rocks in alpine districts. Road-side walls between Spittal of Glenshee and Braemar! Ben Lawers! Morchone! Shores of Loch Muick! Lochnagar! Ben Macdhui! Amulree! *Dr. Lindsay.* Teesdale! *Dr. Carrington.* Great Sugar Loaf Mountain! Ireland, *Mr. R. Jacob.* Brandon Mountains; Ireland, *I. Carroll, Esq.* Aviemore! *Admiral Jones.* Swinhope Hill! Durham, and Cronkley Scarr! Yorkshire. The spermogones are usually both abundant and of frequent occurrence, and quite visible to the naked eye either in a wet or dry state. They are distinct, papillæform, black, indiscriminately scattered over the superior face of the whole thallus in specimens destitute of apothecia, but principally about the periphery in apotheciaferous ones. In a young state the ostioles are occasionally indistinct, but generally they are visible, small, rounded, angular, or stellato-fissured; when old they become enlarged, patent, and distinctly visible, and now and then surrounded by a prominent margin, which is formed by the uplifting of the cortical stratum or the epithallus around them. The spermatia are of the ordinary form, short, cylindrical, usually rather more abundant, than in any of the preceding species; about ·001 in. long, by ·00016 in broad.

6. GYROPORA POLYRRHIZOS, (*L.*) Thallus coriaceous, monophyllous, or polyphyllous, more or less lobed and imbricated, the margins crenate and undulated; upper side smooth, greenish copper-colour, often bearing a few irregular tufts of black fibres; under side black, papillose,

reticulated and densely fibrous. Apothecia not commonly produced appressed, at first simple, orbicular, or lirellæform, plane, immarginate; afterwards variously contorted and subdivided; asci 8 spored; spores elliptical, or elliptical-oblong, unilocular, subhyaline, or hyaline; ·003 to ·0035 in. long, by ·001 to ·0015 in. broad.

Lichen polyrrhizus, L.—*Lichen pellitus*, Ach. Prod.—Sm. E. Bot. 931. —*Gyrophora pellita.* Ach. L. Univ. 228—Hook. Brit. Fl. 2. 219.—*U. polyrrhizos*, Fries L. Ref. 358.—Schær. Enum. 29.—Nyl. Enum. Gen. 107.— *U. varia.* var. *pellita*, Leight. Brit. Umbi. 14.

On rocks in alpine districts. Birnham Hill, Dunkeld! Lochnagar! Road-side walls between Percy and Spittal of Glenshee! and Amulree! *Dr. Lindsay.* Highlands! *Dr. Maingay.* Great Sugar Loaf Mountain, Ireland, *Mr. R. Jacob.* Baysdale Moor! Highcliff! and Ayton Moor! Cleveland, Yorkshire. The spermogones occur more or less abundantly. They are visible to the naked eye when moist, as extremely minute, depressed points, or somewhat prominent papillæ, indiscriminately scattered over the face of the thallus or submarginal, solitary, concolorous with the thallus. The ostioles are mostly perceptible with the aid of a good lens, minute, rounded, or subangular. The spermatia are short, cylindrical, full ·001 in. long, by ·00016 in. broad.

7. Gyrophora vellea, *(L.)* Thallus coriaceous, monophyllous, more or less lobed at the circumference, smooth, glaucous-grey; under side pale-brown towards the periphery, dark-brown in the centre, clothed to a greater or less extent with brown, or nearly black fibres. Apothecia black, very numerous, appressed, superficial, at first papillate, afterwards concentrically proliferous; asci clavato-ventricose, 8 spored; spores oblong, or ovate, unilocular, filled with a finely granular protoplasm, subhyaline, or hyaline; ·0045 to ·005 in. long, by ·0025 to ·003 in. broad.

Lichen vellus, L.—*Umbilicaria vellea*, Fries L. Ref. 357.—Massal. Ric. 60, fig. 110.—Schær. Enum. 23, L. H. 138!—*Gyrophora vellea*, Hepp. Eur. 117!—Kbr. S. L. G. 97.

On rocks in alpine districts; very rare in Great Britain. Clougha! Lancashire, *Mr. R. Jacob.* For the addition of the present very fine species, to the British Flora, we are indebted to the researches of the gentleman just named. Its spermogones are apparently of common occurrence, and on account of the pale glaucous hue of its thallus, they are quite visible to the naked eye. They are papillæform, slightly prominent, numerous, solitary, scattered about the margins of the thallus. The sterigmata and spermatia, bear a general resemblance to those of the preceding species.

* 8. Gyrophora grisea, (*Sw.*) Thallus membranaceous; generally monophyllous, orbicular, the margins crenate and somewhat lobed, papillose on both sides; the upper one pale ash-coloured, naked; under, mostly naked, brownish-black, at times rugulose, or subfibrous. Apothecia depressed, orbicular and reniform, plane and margined when young, afterwards convex, immarginate and concentrically gyrose; asci 8 spored; spores elliptical-oblong, unilocular, subhyaline, or hyaline; ·003 to ·0035 in. long, by ·001 to 0015 in. broad.

Lichen griseus, Swartz.— *Umbilicaria murina*, DC.—Nyl. Enum. Gen. 108.—*Gyrophora murina*, Ach. L. Univ. 231.—Sm. E. Bot. 2486. —Hook. Brit. Fl. 2. 218.—*Umbilicaria vellea*, var. *hirsuta*, subvar.

murina, Fries L. Ref. 358.—*U. vellea*, var. *spadochroa*, subvar. *grisea*, Schær. Enum. 24.—*U. varia*, var. *grisea*, Leight. Brit. Umbi. 16.

On rocks in alpine districts. The claim of this species to rank as British, is in my opinion exceedingly small. It is said to have been found on St. Vincent's Rocks, near Bristol, many years ago, but no one now seems to know anything about such a plant in that neighbourhood, consequently I think it ought at once to be erased from the list of British Lichens.

TRIBE 6. LECANORACEÆ, (*Feé.*)

Thallus variously crustaceous; in the superior genera subfoliaceous, or squamulose, forming a compact squamulose crust in the centre, lobed and effigurate at the circumference; in the inferior, squamuloso-crustaceous, or crustaceous, uniform. Hypothallus various, for the most part persistent, in some evanescent, and in a few absent. Apothecia scutelliform, or subpatellæform, or urceolate, margined by a simple thallodal exciple, a thallodal exciple becoming converted into a proper exciple, or a compound exciple.

SUBTRIBE 1. PANNARINEÆ. (*Kbr.*)

Thallus subfoliaceous, or squamulose, at length crustaceo-compact in the centre, more or less lobed at the circumference. Hypothallus bluish-black. Apothecia scutelliform, or subpatellæform, margined by a thallodal exciple, which at times becomes converted into a proper exciple, or a compound exciple.

GENUS 1. PANNARIA, (*Delis.*)

Apothecia for the most part erumpent, at first closed, tuberculiform, afterwards open scutelliform, or subpatellæform, plane or tumid, margined by a thallodal exciple, or by a thallodal exciple which eventually changes into a subproper exciple; thalamium ceraceo-subgelatinous, arising from a pale, or coloured, simple hypothecium, which is for the most part placed upon the gonidiac stratum; asci oblong, subventricose, or subclavate, each containing 8 spores; spores oblong, or elliptical-oblong, more or less attenuated at the extremities, or subfusiform, unilocular, filled, to a greater or less extent, with a finely granular protoplasm, the external cell-wall often crenulated, uncoloured. Thallus subfoliaceous, or squamulose, at length crustaceous-compact in the centre; hypothallus spongy-pannose, bluish-black, or black.

1. PANNARIA PLUMBEA, (*Lightf.*) Thallus coriaceo-membranaceous, submonophyllous, orbicular, radiato-rugose, livid lead-coloured, broadly lobed, the margins crenulated and somewhat imbricated; hypothallus determinate, spongy, bluish-black. Apothecia small, mostly in the centre, numerous, often congregated together in groups, or confluent; disc reddish-brown, plane, or convex, surrounded by a paler coloured, entire margin; asci oblongo-clavate, 8 spored; spores oblongo-attenuated, unilocular, filled with a finely granular protoplasm, subhyaline; ·003 to ·004 in. long, by ·001 to ·00125 in. broad.

Lichen plumbeus, Lightf.—Sm. E. Bot. 353.—*Parmelia plumbea*, Ach.

Le Port.
Brechou.

Syn. 202.—Fries L. Ref. 87.—Schær. Enum. 35, L. H. 564 !—Leight. Exs. 233 !—*Placodium plumbeum,* Hook. Brit. Fl. 2. 197.—*Pannaria plumbea,* Massal. Ric. 110. fig. 216.—Kbr. S. L. G. 109.—*Coccocarpia plumbea,* Nyl. Enum. Gen. 109.—*Amphiloma plumbea,* Hepp. Eur. 375 !

β. MYRIOCARPA, (*Delis.*) Thallus orbicular, minutely lobed; the centre rugose, conglobato-crustaceous; the circumference radiated. Apothecia small, crowded and grouped together; disc pale reddish-brown, surrounded by a paler margin. Otherwise as above.

Pannaria myriocarpa, Delis.—*Parmelia plumbea,* b. Fries L. Ref. 87.—Schær. Enum. 36.—*Pannaria plumbea,* β. Massal. Ric. 110. fig. 217.—*Amphiloma plumbea,* β. Hepp. Eur. 376 !

On the trunks of trees, in mountainous districts, especially in the neighbourhood of lakes, etc. Fall of Foyers, Caledonian Canal ! and Glen Nevis, Lochaber ! *Dr. Lindsay.* Near Eglestone! Durham, *Rev. J. Harriman.* Birks of Aberfeldy ! Perthshire, *H. Macmillan, Esq.* Cumberland ! ex. herb. *Rev. W. A. Leighton.* Sussex ! *Mr. John Hemmings.* The spermogones are not uncommon. They are small, visible to the naked eye, but not distinguishable from the thallodal granules which usually occur on the surface of the thallus, on account of being of the same colour. They are mamillæform, irregularly scattered about the periphery, isolated and regular in their outline, or congregated together, confluent and irregular. The ostioles are generally of a deeper brown than the thallus, hence they often aid in the discrimination of the spermogones. The sterigmata are articulated and slightly branched. The spermatia are very abundant, issuing, on the application of a little water and pressure, in a dense grey cloud; individually they are short, cylindrical, ·001 to ·00125 in. long, by ·00016 in. broad.

2. PANNARIA RUBIGINOSA, (*Thunb.*) Thallus membranaceous, suborbicular, imbricato-lobed, smooth, livid lead-colour; lobes minute and much crowded in the centre; enlarged and laciniato-multifid at the circumference; margins crenulated, silvery-white; hypothallus indeterminate, tomentose, bluish-black. Apothecia of a medium size, central; disc reddish-brown, plane, surrounded by an incurved, crenulated, silvery-white, thallodal margin; asci subclavate, 8 spored; spores elliptical, or elliptical-oblong, unilocular, subhyaline; ·0035 to ·004 in. long, by ·0015 to ·002 in. broad.

Lichen rubiginosus, Thunb.—*Lichen rffinis,* Dicks.—Sm. E. Bot. 983.—*Parmelia rubiginosa,* Ach. Syn. 201.—Fries L. Ref. 88.—Schær. Enum. 36, L. H. 563 !—Leight. Exs. 234 !—*Squamaria affinis,* Hook. Brit. Fl. 2. 196.—*Pannaria rubiginosa,* Massal. Ric. 111. fig. 218.—Kbr. S. L. G. 105.—Nyl. Enum. Gen. 109.

β. CŒRULEO-BADIA, (*Schleich.*) Thallus granuloso-pulverulent in the centre, of a bluish-white colour; roundly lobed and crenulated at the circumference; the margins elevated, pulverulent. Otherwise as above.

Lichen cœruleo-badia, Schleich.—*Parmelia conoplea,* Ach.—*P. rubiginosa,* b. *conoplea,* Fries L. Ref. 88.—*P. rubiginosa,* β. *cœruleo-badia,* Schær. Enum. 36, L. H. 369 !—*Pannaria cœruleo-badia,* Massal. Ric. 111. fig. 219.

On the trunks of trees, in subalpine districts. Teesdale ! Durham, *Rev. J. Harriman.* Stanstead Park ! Essex, *Mr. R. Jacob.* Near Aberfeldy ! *Dr. Maingay.* Near Settle ! Yorkshire, *Dr. Windsor.*

Drumlanrig Wood! *Mr. W. Stevens.* The present is somewhat allied to the preceding species in its external appearance. It differs from it however, by its thallus being much more divided, and more minutely lobed, and by its apothecia being margined by a true thallodal exciple. The spermogones are not often present, either in this or the following species.

3. PANNARIA MICROPHYLLA, (*Swartz.*) Thallus squamulose, greyish-brown; squamules cartilaginous, minute, imbricated and crowded, lobed and crenated, eventually forming a thick granulose, diffracto-areolate, crust; hypothallus bluish or brownish-black. Apothecia of a medium size, superficial, scattered, or congregated together into little groups; disc at first plane, pale-brown, afterwards convex, dark-brown, surrounded by a thin, crenated, thallodal margin, which eventually becomes obliterated by the swelling of the disc; asci narrow-oblong, 8 spored; spores elliptical-oblong, unilocular, filled with a finely granular protoplasm, subhyaline; ·003 to 0035 in. long, by ·001 to ·0015 in broad.

Lichen microphyllus, Swartz.—*Lichen escharoides*, Sm. E. Bot. 1247. *Parmelia microphylla*, Fries L. Ref. 90.—*Lecidea coronata, β. escharoides*, Hook. Brit. Fl. 2. 182.—*Lecidea microphylla*, Schær. Enum. 98, L. H. 161!—*Pannaria, microphylla*, Massal. Ric. 112. fig. 221.—Nyl. Enum. Gen. 109.

On the trunks of trees near the ground, and on rocks in shady woods, etc., in alpine districts; very rare. I have not seen specimens of British growth. The above description has been taken principally from a specimen given to me by DR. NYLANDER. It is very closely allied to the next species, and apparently only differs from it, by its thallus being cartilaginous, and by its apothecia being smaller and more crowded.

4. PANNARIA TRIPTOPHYLLA, (*Ach.*) Thallus suborbicular, squamulose, subimbricated, greyish-brown, or pale olive; squamules membranaceous, laciniato-lobed and crenated at the circumference, minute and crowded in the centre, compact, at length separated into a diffracto-areolate, granuloso-coralline crust; hypothallus conspicuous, bluish-black, Apothecia of a medium size, sparingly produced, irregularly scattered, sessile; disc plane, chestnut-brown, surrounded by a smooth, slightly flexuose, subpersistent margin of nearly the same colour as the disc; asci oblong, 8 spored; spores elliptical-oblong, attenuated, unilocular, filled with a finely granular protoplasm, the external wall more or less crenated, subhaline; .003 to ·004 in. long, by ·00125 to ·0015 in. broad.

Lecidea triptophylla, Ach. L. Univ. 215.—Schær. Enum. 98, L. H. 159!—*Lichen microphyllus*, Sm. E. Bot. 2128.—*Parmelia triptophylla*, c. *Schraderi*, Fries L. Ref. 91.—*Placodium microphyllum*, Hook. Brit. Fl. 2. 198.—*Pannaria triptophylla*, Massal. Ric. 112. fig. 222.—Kbr. S. L. G. 107.—Nyl. Enum. Gen. 109.

On the trunks of trees, in moist shady woods, etc., in subalpine districts. Barmouth! North Wales, *Rev. T. Salwey*. Sussex! *Mr. John Hemmings*. Powerscourt Waterfall! *Mr. R. Jacob*. County of Antrim! *Dr. Taylor*. Chiefly distinguished from the preceding by its thinner thallus, and its larger and more scattered apothecia.

5. PANNARIA BRUNNEA, (*Swartz.*) Thallus suborbicular, squamulose, pale glaucous-green when wet, greyish-brown when dry; scales

minute, imbricated, lobed and crenated, at length compacted into an uneven granulose crust; hypothallus thin, brownish-black. Apothecia rather large, or of a medium size, at first orbicular, at length somewhat lobed, flexuose, or confluent; disc plane, or convex, varying in colour from light-brown to dark-red, surrounded by an inflexed, granulated, thallodal margin; asci oblong, 8 spored; spores elliptical-oblong, attenuated towards each extremity, unilocular, filled with granular protoplasm, the external wall more or less crenated, subhyaline; ·005 to ·006 in. long, by ·002 to ·00225 in. broad. Pl. 2. *fig.* 37.

Lichen brunneus, Swartz.—*Parmelia brunnea*, Fries L. Ref. 93.—*Lecanora pezizoides*, Borr. in E. Bot. Suppl. 2801.—*Lecidea triptophylla*, γ. *pezizoides*, Schær. Enum. 99, L. H. 160!—*Pannaria brunnea*, γ. *pezizoides*, Massal Ric. 113, fig. 224.—*Amphiloma hypnorum*, Hepp. Eur. 174!—*Pannaria brunnea*, Kbr. S. L. G. 107.—Nyl. Enum. Gen. 109.

β. CORONATA, (*Hoffm.*) Thallus squamulose; squamules minute, subimbricato-lobed, olive-brown, at length granuloso-crustaceous. Apothecia generally small, numerous; disc reddish-brown, surrounded by a granuloso-crenated margin. Spores ·004 in. long, by ·0015 in. broad. Otherwise as above.

Psora coronata, Hoffm.—*Lichen brunneus*, Sm. E. Bot. 1246.—*Lecanora brunnea*, β. *coronata*, Ach. Syn. 192.—*Parmelia triptophylla*, a. and b. Fries L. Ref. 91.—*Lecidea coronata*, Hook. Brit. Fl. 2. 182.—*Lecidea triptophylla*, β. Schær. Enum. 98.—*Biatora coronata*, Leight. Exs. 235!—*Pannaria brunnea*, Massal. Ric. 113.—*P. brunnea*, β. Kbr. S. L. G. 108.

On rocks, or on the ground, among turf or decayed mosses in moist, shady situations. Eglestone! Durham, *Rev. J. Harriman.* Sawley Moor! near Ripon, Yorkshire, *Mr. W. Brunton.* Near Thirsk! *I. G. Baker, Esq.* Stansfield Moor! near Todmorden, *Mr. John Nowell.* Summit of Brandon! and near Cork! Ireland, *I. Carroll, Esq.* Near Hurtspierpoint! Sussex, *Mr. John Hemmings.* Hoggart's Wood! Ingleby; Battersby Bank! and Oggeray Gill! Cleveland, Yorkshire.

6. PANNARIA HYPNORUM, (*Vahl.*) Thallus diffuse, squamuloso-crustaceous, pale yellowish-brown; squamules minute, rounded, granulato-crenulated, and somewhat imbricated; under side naked and nearly of the same colour; hypothallus evanescent. Apothecia of a medium size, at first urceolate, afterwards plane, generally numerous; disc somewhat shining, orange-coloured, becoming reddish-brown, surrounded by an elevated, granulose, thallodal margin; asci broadly cylindrical, 8 spored; spores oblong, or ovate, more or less attenuated towards the extremities, unilocular, filled with granular protoplasm, the external wall subcrenulated, subhyaline; ·004 to ·006 in. long, by ·00175 to ·002 in. broad.

Lichen hypnorum, Vahl.—Sm. E. Bot. 740.—*Lecanora hypnorum*, Ach. Syn. 193.—*Parmelia.* Fries L. Ref. 98.—Schær. Enum. 53, L. H. 546!—*Squamaria hypnorum*, Hook. Brit. 2. 194.—*Pannaria.* Kbr. S. L. G. 108.—*Psoroma.* Nyl. Enum. Gen. 108.

On the ground upon mosses, and at times on mossy trunks of trees. Eglestone! Durham, *Rev. J. Harriman.* Near Brighton! Sussex, *Mr. John Hemmings.* This species is arranged in a separate genus by Dr. Nylander, but I see no good reason for such an isolation. It is very closely allied to the preceding species, and often scarcely distinguishable from it.

7. Pannaria Hookeri, (*Smith.*) Thallus membranaceo-cartilaginous, squamulose, glaucous-white, or olive; squamules minute, imbricated, lobed and crenulated, somewhat radiant at the circumference; granuloso-crustaceous in the centre; hypothallus black, subfibrillose. Apothecia small, mostly in the centre, numerous, sessile; disc plane, nearly black, surrounded by an erect, crenulated, thallodal margin; asci 8 spored; spores oblong, unilocular, filled with a finely granular protoplasm, subhyaline; ·003 to ·004 in. long, by ·00125 in. broad.

Lichen Hookeri, Sm. E. Bot. 2283.—*Parmelia Hookeri,* Fries L. Ref. 94.—Schær. Enum. 54.—*Lecanora leucolepis,* Ach. Syn. 194.—Leight. Exs. 267! *Squamaria leucolepis,* Hook. Brit. Fl. 2. 194.—*Pannaria Hookeri,* Nyl. Enum. Gen. 109.

On micaceous rocks. Highlands of Scotland! *Admiral Jones.* Ben Lawers! *Dr. Maingay.* The present species is well characterised, by the colour of both its thallus and apothecia.

8. Pannaria curvescens, *Mudd.* Thallus effuse, thin, granulose, or very minutely squamulose, dark-brown, or nearly black. Apothecia of a medium size, elevato-sessile, irregularly scattered, at first urceolate, afterwards gradually expanded, plane, and eventually slightly convex; disc dark reddish-brown, surrounded by a smooth, inflexed margin, of a rather paler colour than the disc; hypothecium very pale yellow, grumous; paraphyses conglutinate, pale yellowish-brown, when viewed in masses; asci broadly clavate, subevanescent, 6-8 spored; spores obtusely-fusiform, straight, curved, or slightly flexuose, unilocular, hyaline; ·008 to ·01 in. long, by ·001 in. broad. Plate 2. *fig.* 38.

Discovered by *Admiral Jones,* growing upon Andreæa alpina, on the top of Ben Lawers! As a species, nothing can be more distinct than the present. The thallus is extremely thin, granulose, or very minutely squamulose, often scarcely perceptible, spreading in an irregular manner over the stems of the Andreæa, and nearly concolorous with it. The apothecia are at first minute and urceolate, afterwards enlarged and spread out, but always surrounded by a smooth margin, of a paler colour than the disc. The spores are long and slender, curved or bent, nearly straight, or flexuose; the degree of curvature of each spore being due to the position held while in the ascus. This species is arranged here, chiefly on account of its apothecia bearing a general resemblance to those of *P. triptophylla* and *P. plumbea.*

Genus 2. Massalongia, (*Kbr.*)

Apothecia when young closed, tuberculiform, normally scutelliform, or subpatellæform, margined by a thallodal exciple, or by a compound exciple; thalamium arising from a pale, thickish, simple hypothecium; asci subpetiolato-clavate, 8 spored; spores subfusiform, bilocular; each loculus more or less filled with finely granular protoplasm, uncoloured. Thallus foliaceo-squamulose, or squamulose at length crustaceous in the centre; hypothallus brownish-black, evanescent.

The species constituting this genus are distinguished from those of the preceding one, chiefly by the internal organization of their spores.

1. MASSALONGIA CARNOSA, (*Dicks.*) Thallus membranaceous, foliaceo-squamulose, smooth, pale brown; squamules very minute in the centre, often subcrustaceous, those at the circumference larger, elongato-lacinulate, somewhat imbricated, their margins crenate, bluish, and slightly pulverulent; under side pale. Apothecia somewhat elevated, prominent, of a medium size, solitary or grouped; disc plane, orange-red, or dark-red, surrounded by a smooth slightly elevated paler margin; asci subpetiolato-clavate, 6-8 spored; spores elongato-fusiform, bilocular, each loculus more or less filled with a finely granular protoplasm, and at times broken up and confused, subhyaline; ·005 to ·007 in. long, by ·0015 to ·00175 in. broad. PLATE 2, *fig.* 39.

Lichen carnosus, Dicks.—Sm. E. Bot. 1684.—*Parmelia muscorum*, Fries L. Ref. 95.—*Squamaria muscorum*, Hook. Brit. Fl. 2. 194.—*Parmelia carnosa*, Schær. Enum. 53, L. H. 482!—*Massalongia carnosa*, Kbr. S. L. G. 109.

On mosses, on rocks and trees in mountainous districts; rare. Teesdale! Durham, *Rev. J. Harriman.* Dublin Mountains! Ireland, *Admiral Jones.* The present species is distinguished from the following one, by its squamules being larger, thinner, looser, and more spreading, and by the form and size of its spores.

2. MASSALONGIA CHEILEA, (*Nyl.*) Thallus squamulose, greyish or olive-brown; squamules cartilaginous, at first minute, rounded, and turgid, afterwards somewhat dilated, inciso-lobed and crenate, and eventually crowded, imbricated, and aggregated together, forming a thick squamulose crust, which, when dry, becomes diffracto-areolate and friable; hypothallus dark-brown, becoming black. Apothecia of a medium size, subinnato-sessile; disc plano-convex, from pale brown, becoming dark reddish-brown, surrounded by a thin, entire, or crenated, thallodal margin; asci narrow, elongato-clavate, 8 spored; spores elliptical-oblong, or ovate, bilocular, each loculus filled with a finely granular protoplasm, subhyaline; ·004 to ·005 in long, by ·00125 to ·00225 in. broad.

Pannaria cheilea, Nyl. M. S. S.

On rocks in moist shady places. Blackwater Bridge! County Kerry, *I. Carroll, Esq.* Stroove Head! Donegal! Ireland, *Professor Dickie.* For this interesting addition to our British Flora, we are indebted to the gentlemen just named. Mr. Carroll forwarded specimens to Dr. Nylander, who pronounced it as his *Pannaria cheilea.* It differs from all the *Pannaria,* as defined by me, by having bilocular spores; but in other respects it is allied to them.

GENUS 3. AMPHILOMA (*Fries*).

"Apothecia (very rarely produced) scutelliform, margined by a thallodal exciple." Thallus membranaceous, granuloso-pulverulent in the centre, lobed at the circumference; hypothallus tomentose, brown, or bluish-black.

The single species constituting this genus, is very rarely met with in a state of fructification, and I regret to say that I have neither seen apothecia, nor spermogones, consequently, both the genus and species, are here necessarily imperfectly characterised.

1. AMPHILOMA LANUGINOSA, (*Ach.*) Thallus membranaceous, orbi-

cular, yellowish-white; granuloso-pulverulent in the centre; roundly lobed and crenulated at the circumference, which at length becomes pulverulent also, and in its last stage the whole thallus becomes dissolved into a creamy-white powder. "Apothecia very rarely present; disc reddish-brown, surrounded by a pulverulent, thallodal margin." Spores......?

Parmelia lanuginosa, Ach. Syn. 201.—Fries L. Ref. 88.—Leight. Exs. 55!—*Squamaria lanuginosa*, Hook. Brit. Fl. 2. 196.—*P. caperata*, *β. membranacea*, Schær. Enum. 35, L. H. 378!—*Pannaria lanuginosa*, Kbr. S. L. G. 106.—*Amphiloma lanuginosa*, Nyl. Enum. Gen. 110.

On rocks in shady situations; also among mosses, &c. Bolton! *Dr. Carrington.* Near Frosterley! and on Falcon Clints! Durham; and on rocks in shady woods, Kildale! Cleveland, Yorkshire.

SUBTRIBE 2. PLACODINEÆ.

Thallus rimoso-areolate, or squamulose in the centre; squamuloso-radiated at the circumference. Hypothallus often absent, or indistinct. Apothecia scutelliform, margined by a thallodal exciple.

GENUS 4. SQUAMARIA, (*D.C.*)

Apothecia at first closed, innate, at length superficial, scutelliform, margined by a thallodal exciple; thalamium arising from a gelatinoso-carnose, simple hypothecium, which is placed either upon the cortical, or gonimous stratum; asci oblong, or clavate, 8 spored; spores oblong, or elliptical-oblong, unilocular, uncoloured. Thallus rimoso-areolate, or squamulose in the centre; radiato-plicate, or squamuloso-lobed at the circumference.

1. SQUAMARIA CRASSA, (*Huds.*) Thallus cartilaginous, squamose, thick, irregularly imbricated, greenish-white; lobes spreading horizontally, rounded inciso-crenate; under side brown. Apothecia of a medium size, tolerably numerous, sessile; disc nearly flat, reddish brown, surrounded by an elevated, thallodal margin; asci small, 8 spored; spores elliptical-oblong, unilocular, subhyaline, or hyaline; ·0025 to ·003 in. by ·001 in. broad.

Lichen crassus, Huds.—Sm. E. Bot. 1893.—*Lecanora crassa*, Ach. Syn. 190.—*Parmelia crassa*, Fries L. Ref. 100.—*Squamaria crassa*, Hook. Brit. Fl. 2. 193.—Nyl. Enum. Gen. 110, L. P. 116!—*Lecanora crassa*, *β. cæspitosa*, Schær. Enum. 58, L. H. 343!—*Psoroma crassa*, Kbr. S. L. G. 119.

On limestone rocks, and on the earth, but generally in limestone districts. Eglestone! Durham, *Rev. J. Harriman.* Wensleydale! Yorkshire, *W. Brunton, Esq.* Near Dublin! *I. Carroll, Esq.* Near Bristol! *Miss M. Atwood.* Hurstpierpoint! Sussex, *Mr. John Hemmings.* Near Settle! *Dr. Windsor.* The spermogones are of very rare occurrence. I have only met with them on one occasion; on specimens from San Diego! Teneriffe, collected by *E. Bourgeau.* They are very minute, and quite imperceptible to the eye when unassisted, pale-brown, or flesh-coloured at first, afterwards dark-brown, papillæform, slightly prominent, isolated, sparingly scattered over the surface of the sterile squamules. The ostioles are mostly imperceptible, rounded, or irregularly fissured. The sterigmata are simple, fine and delicate. The spermatia are extremely beautiful, being curved and undulated in various ways, but never very abundant. They are filiform, ·005 to ·009 in. long, by ·0001 in. broad. The difference in length being attributable to the degree of curvature of each spermatium, as, on account of their great tenuity, they are only measurable in a straight line from one extremity to the other.

2. Squamaria lentigera, (*Weber.*) Thallus appressed, orbicular, thickish, crustaceous in the centre, radiato-lobed at the circumference, white when dry, greenish-white when wet; lobes rather broad, slightly concave, undulated and crenated; under side white. Apothecia of a medium size, numerous, adnate; disc nearly plane, or somewhat convex, of a waxy-brown colour, surrounded by a white thallodal margin; asci small, 8 spored; spores oblong or elliptical-oblong, unilocular, subhyaline, or hyaline; ·0025 to ·003 in. long, by ·001 in. broad. Pl. 2, *fig.* 40.

Lichen lentigerus, Weber.—Sm. E. Bot. 871.—*Lecanora lentigera*, Ach. Syn. 179.—Hepp. Eur. 179!—*Parmelia lentigera*, Fries L. Ref. 103!—*Squamaria lentigera*, Hook. Brit. Fl. 2. 195.—Nyl. Enum. Gen. 110.—*Lecanora crassa*, var *lentigera*, Schær. Enum. 58, L. H. 484!—*Psoroma lentigera*, Massal. Ric. 20. fig. 30.—Kbr. S. L. G. 119.

On dry heaths, &c., in chalk districts; local. Cambridgeshire! *Rev. J. Dalton*, no locality specified. Near Newhaven! Sussex, *Mr. John Hemmings*. The spermogones are not uncommon. They are exceedingly minute, invisible to the eye, punctiform, wholly immersed in the thallus, or slightly raised above it, solitary, of a pale waxy-brown colour, but in this respect they are often scarcely distinguishable from the thallus. They are usually scattered about the periphery, and their presence indicated by extremely minute, round depressions, or by elongated or irregular fissures in the epithallus of the squamules on which they occur. The spermatia are very numerous, issuing in a dense mass, variously curved and twisted, filiform; ·006 to ·009 in. long, by ·0001 in. broad. The sterigmata are simple, somewhat palmately divided at their base, very fine and delicate.

3. Squamaria cartilaginea, (*Westr.*) Thallus cartilaginous, rigid when dry, flexible when wet, foliaceo-squamulose, smooth, greenish straw-coloured; lobes imbricated, irregularly linear, repeatedly and somewhat dichotomously divided; their extremities slightly dilated, and occasionally a little thickened; under side pale brown, naked. Apothecia rather large, numerous, at first orbicular and urceolate, afterwards irregularly dilato-lobed and angular, flattish; disc buff-coloured, or light-brown, surrounded by a slightly elevated, persistent, thallodal margin; asci cuneato-clavate, 8 spored; spores elliptical oblong, or linear-oblong, unilocular, filled with a very fine granular protoplasm, subhyaline; ·002 to ·004 in. long, by ·001 to ·00125 in. broad.

Lichen cartilagineus, Westr.—*Parmelia cartilaginea*, Ach.—Borrer in E. Bot. Suppl. 2802.—Fries L. Ref. 112.—Schær. Enum. 52.—*Lecanora cartilaginea*, Hepp. Eur. 59.—*Placodium cartilagineum*, Kbr. S. L. G. 116.—*Squamaria cartilaginea*, Nyl. Enum. Gen. 110.

On rocks. Near the outlet of Llyn Bodlyn! Barmouth, *Rev. T. Salwey*. The spermogones are apparently not of uncommon occurrence, but they are exceedingly minute and difficult to detect; however, if the thallus is well saturated with water, and allowed to soak for a short time, their presence or absence may be always ascertained by the assistance of a good pocket lens. They are punctiform, wholly immersed in the tissue of the thallus, and of nearly the same colour, isolated and rather distantly scattered over the superior face of the circumferential lobes, outwardly looking like minute points or punctures. The spermatia are not very numerous, but they are extremely delicate and beautiful, being elegantly undulated or curved, of an equal width throughout, about ·007 to ·009 in. long, by ·00008 in. broad. The sterigmata are similar to those of the last species.

4. Squamaria saxicola, (*Pollich.*) Thallus cartilaginous, orbicular, appressed, areolato-squamose, pale sulphurous-green; laciniæ plane, imbricated, dilated and radiato-lobed, and crenate, at the circumference; hypothallus black, evanescent. Apothecia of a medium size, numerous, central, sessile; disc plane, tawny-brown, surrounded by a crenated, thallodal margin; asci cuneato-clavate, 8 spored; spores oblong or elliptical, unilocular, subhyaline; ·0025 in. long, by ·001 in. broad.

Lichen saxicola, Pollich.—Sm. E. Bot. 1695.—*Lecanora saxicola*, Ach. Syn, 180.—*Parmelia saxicola*, Fries L. Ref. 110.—*Squamaria sacicola*, Hook. Brit. Fl. 2. 197.—Nyl. Enum. Gen. 110.—*Lecanora muralis*, *α. saxicola*, Schær. Enum. 66, L. H. 332!—*Placodium saxicolum*, Massal. Ric. 23. fig. 36.—Kbr. S. L. G. 115.

β. areolata, *Leight.* Thallus cartilaginous, rimoso-areolate in the centre, effigurato-lobed at the circumference, greyish-green, or pale-brown. Apothecia central; disc plano-convex, the thallodal margin often obliterated. Spores as above.

Parmelia saxicola, var. *areolata*, Leight. Exs. 81!

On exposed rocks, in subalpine districts. Teesdale! Durham, *Rev. J. Harriman.* Cliffrig! and Lounsdale! Cleveland, Yorkshire. The thallus of this species is frequently infested with a minute parasite, which outwardly somewhat resembles the spermogones; it is described in the latter part of this work as a *Thelidium.* The spermogones of *S. saxicola* are very difficult to detect, on account of their minuteness, and by being nearly of the same colour as the thallus; consequently it is not an easy matter to form a correct opinion as to the frequency of their occurrence. They are imperceptible without the aid of a good lens, punctiform, wholly immersed in the thallus, and nearly of the same colour, solitary, scattered over the superior surface of the circumferential squamules, and occasionally on the more central ones too, but never in any very great quantity. The sterigmata are short and simple. The spermatia are very numerous, delicate, and beautiful, curved, or variously undulated, filiform, ·007 to 009 in. long, by ·00008 in. broad.

5. Squamaria gelida, (*L.*) Thallus tartareous, orbicular, closely adherent, smooth, creamy-white; rimoso-areolate, and often bearing a few large radiated verrucæ in the centre; laciniato-lobed at the circumference. Apothecia of a medium size, adnate, sparingly scattered; disc concave or plane, pale rose-coloured, surrounded by a smooth, elevated, thallodal margin; asci elongated, subcylindrical, 8 spored, uniserial; spores elliptical-oblong, unilocular, hyaline, or of a very delicate rose-colour; ·003 in. long, by ·0015 in. broad.

Lichen gelidus, L.—Sm. E. Bot. 699.—*Lecanora gelida*, Ach. Syn.

186.—Schær. Enum. 60.—*Parmelia gelida,* Fries L. Ref. 104.—*Squamaria gelida,* Hook. Brit. Fl. 2. 195.—Nyl. Enum. Gen. 111.—*Placodium gelidum,* Kbr. S. L. G. 117.

On rocks, in alpine districts. Teesdale ! Durham, *Rev. J. Harriman.* Ambleside ! *S. Hailstone, Esq.* Ben Lawers ! *Dr. Maingay.* Connor Cliff ! Dingle, Ireland, *I. Carroll, Esq.* Two minute parasitic *fungi* occurs on the thallus of the Teesdale specimens, and in order to prevent their confusion with either the apothecia or the spermogones, I here insert a description of them, under the following provisional names. 1. *Sphæria squamarioides,*—Perithecia black, punctiform, aggregated together into little groups ; nucleus greyish-white; paraphyses indistinct, diffluent, mucoso-mucilaginous ; asci elongato-oblong, or oblongo-subclavate, 8 spored ; spores obtusely-fusiform, or fusiform, bilocular, at times slightly constricted in the middle, dark-olive, or nearly black ; ·0035 to ·0045 in. long, by ·00125 to ·0015 in. broad.—2. *Sphæria gelidaria,* Perithecia black, maculæform, scattered ; nucleus white ; paraphyses distinct, lax, flexuose, mixed with a hyaline watery substance ; asci short, cylindrical, 4 spored, constricted *opposite* each spore ; spores subrotund, or broadly-oblong, their outline irregular, filled with a dark-red, or nearly black protoplasm, obscurely bilocular ; ·004 in. long, by ·0025 in. broad.—Hab. parasitic on the thallus of *Squamaria gelida.*

6. SQUAMARIA CIRCINATA, (*Pers.*) Thallus tartareous, orbicular, closely adherent, verrucoso-areolate in the centre, radioso-plicate at the circumference, greyish or greyish-brown. Apothecia small, numerous, central, innate ; disc at first depressed, afterwards plane, dark-brown, or black, surrounded by an even, smooth, thallodal margin ; asci clavate, 8 spored ; spores oblong, or ovate, filled with a granular protoplasm, irregularly unilocular, subhyaline ; ·0025 to ·003 in. long, by ·00125 in. broad.

Lichen circinatus, Pers.—Sm. E. Bot. 1941.—*Lecanora circinata,* Ach. Syn. 184.—*Par. circinata,* Fries L. Ref. 123.—*Squa. circinata,* Hook. Brit. Fl. 2. 196.—*Lecan. radiosa, α. circinata,* Schær. Enum. 61, L. H. 328 !—*Placodium circinatum,* Kbr. S. L. G. 114.—Nyl. Enum. Gen. 111.—*Pla. radiosum,* Massal. Ric. 22. fig. 34.

On limestone rocks, but not very common. Barnard Castle ! Durham, *Rev. J. Harriman.* The spermogones are apparently of frequent occurrence. They are minute, visible by the aid of an ordinary lens, papillæform, more or less prominent, dark-brown, numerous, solitary, usually most abundant towards the periphery, and on sterile areolæ. The spermatia are very numerous, short, cylindrical, or linear-oblong, straight, ·001 in. long, by ·0002 to ·00016 in. broad. The sterigmata are short, and sparingly articulated.

GENUS 5. PLACODIUM, (*DC.*)

Apothecia at first closed, afterwards explanate, scutelliform, margined by a thallodal exciple ; thalamium arising from a thinnish, simple hypothecium, which is placed upon the gonidiac stratum; asci cylindrico-clavate, each containing 8 spores ; spores elliptical, or oblong, polaribilocular, uncoloured. Thallus rimoso-areolate in the centre, lobed, or radioso-plicate at the circumference. Hypothallus obsolete.

Sect. A. *Thallus greenish-yellow, or yellowish-orange.*

1. Placodium fulgens, (*Swartz.*) Thallus orbicular, crustaceo-foliaceous, submonophyllous, closely adherent, pale yellow, or lemon-coloured; radioso-lobed, and plicate, and rather paler in colour at the circumference. Apothecia small, irregularly scattered, not very numerous, sessile; disc plano-convex, deep orange; margin at first somewhat elevated, of the same colour as the thallus, afterwards obliterated, or nearly so; asci clavate, 8 spored; spores oblong, or elliptical-oblong, obscurely polari-bilocular, or each spore containing a rounded globule near each extremity or pole, hyaline, or subhyaline; ·0025 in. long, by ·001 in. broad.

Lichen fulgens, Swartz.—Sm. E. Bot. 1667.—*Lecanora fulgens,* Ach. Syn. 183.—*Parmelia fulgens,* Fries L. Ref. 119.—*Squamaria fulgens,* Hook. Brit. Fl. 2, 195.—*Lecanora friabilis, α. fulgens.* Schær. Enum. 64, L. H. 339!—*Psorma fulgens,* Massal. Ric. 21. fig. 33.—Kbr. S. L. G. 118.—*Placodium fulgens,* Hepp. Eur. 194!—Nyl. Enum. Gen. 111.

On rocks slightly covered with earth, or on the ground in sandy places, but not common. Clougha Lane! Lancashire, *Mr. R. Jacob.* On cliffs, near Newhaven! Sussex, *Mr. John Hemmings.* The spermogones are of common occurrence. They are visible to the eye after the thallus has been moistened with water, as extremely minute orange-red prominent verrucæ. They are indiscriminately scattered over the whole face of the thallus, but occasionally only towards the periphery. The sterigmata are undefinable further than a grey mass of tissue. The spermatia are abundant, subellipsoid, exceedingly minute, about ·00025 to ·0005 in. long, by ·0001. in. broad; but often atomic and unmeasurable.

2. Placodium elegans, (*Link.*) Thallus orbicular, stellato-radiose, appressed, yellowish-orange, or dark orange-red; laciniæ somewhat distinct, linear, convex, torulose, and undulated; naked on both sides. Apothecia of a medium size, numerous, adnate; disc at first concave, afterwards plane, concolorous with the thallus, surrounded by an entire thallodal margin; asci cylindrico-clavate, 8 spored; spores oblong, or elliptical-oblong, polari-bilocular, hyaline; ·0025 to ·003 in. long, by ·001 to ·0015 in. broad. Pl. 2. *fig.* 41.

Lichen elegans, Link.—*Parmelia elegans,* Fries L. F. 114.—Schær. Enum. 51, L. H. 338! and 545!—*Placodium elegans,* Hepp. Eur. 195! —Nyl. Enum. Gen. 111.—*Amphiloma elegans,* Kbr. S. L. G. 110.

β. discreta, (*Schær.*) Laciniæ very minute, distinct, and scattered. Apothecia and spores as above.

Parmelia elegans, β. discreta, Schær. Enum. 52, L. H. 481!

On rocks and stones, in exposed situations, but not common. On rocks at the foot of Lochnagar! and on sandstone rocks one mile south of Edinburgh! *Dr. Maingay.* Ireland! ex. herb. *I. Carroll, Esq.* Clougha! Lancashire, *Mr. R. Jacob.* The *Lichen elegans* of Sm. E. Bot. 2181, I regard as a state of *P. murorum,* the true *elegans* being a much larger plant, and by no means so generally distributed; in fact the only British specimens referrible to this species, which I have seen, are from the localities just mentioned. It is distinguished from all the forms of *murorum,* by its much larger thallus, and by its somewhat separated, linear, torulose laciniæ. Its spermogones are not of very general occurrence. They are minute, invisible to the naked eye, orange-red, or of the same colour as the thallus, and on this account not easily recognised, verrucæform, solitary, scattered towards the extremities of the laciniæ. The sterigmata are indistinct, or undefinable further than a grey mass of tissue. The spermatia are very numerous, subellipsoid, for the most part atomic and unmeasurable.

3. PLACODIUM MURORUM, (*Hoffm.*) Thallus closely adherent, orbicular, radiated, bright-yellow, becoming greenish or nearly white in the centre when old; rimosa-areolate, or areolato-squamose in the middle, plicato-lobed at the periphery; laciniæ narrow and more or less convex, Apothecia of a medium size, numerous, central, sessile; disc plano-convex, orange-coloured, surrounded by a smooth thallodal margin; asci cylindrico-clavate, 8 spored; spores elliptical, polari-bilocular, the poles or extremities usually protruded beyond the elliptic outline, subhyaline, or hyaline; ·002 to ·0025 in. long, by ·00125 to ·0015 in. broad.

α. MURORUM, (*Hoffm.*)

Lichen murorum, Hoffm.—Ach. Prod.—Sm. E. Bot. 2157. in pt.—*Parmelia murorum*, Fries L. Ref. 115.—Leight. Exs. 113.—*Squamaria murorum*, Hook. Brit. Fl. 2. 194 in pt.—*Lecanora murorum*, Schær. Enum. 63, L. H. 479 !—*Placodium murorum*, Hepp. Eur. 196 !—Nyl. Enum. Gen. 111.—*Amphiloma murorum*, Kbr. S. L. G. 111.

β. LOBULATUM, (*Flk.*) Thallus orbicular, minute, radioso-lobed, forming patches from one eighth of an inch to half a one in diameter, bright-yellow, or orange-red. Apothecia minute, often very numerous, central, sessile; disc plano-convex, of the same colour as the thallus, or nearly so, surrounded by a thin, thallodal margin; spores elliptical-oblong, polari-bilocular, hyaline; ·0025 in. long, by ·001 in. broad.

Lecanora lobulata, Florke.—*L. murorum*, var. *lobulatum*, Schær. Enum. 64.—*Placodium murorum*, var. *lobulatum*, Hepp. Eur. 71 !—*P. murorum*, var. Leight. Exs. 207 !

γ. MINIATUM, (*Hoffm.*) Thallus adnate, crustaceous, orange-red; verrucoso-areolate in the centre, radiated at the circumference. Apothecia small, numerous; disc plano-convex, of a rather deeper colour than the thallus. Otherwise as in the last variety.

Lobaria miniata, Hoffm.—*Lecanora miniata*, Ach. Syn. 182.—Leight. Exs. 268 !—*Squamaria miniata*, Hook. Brit. Fl. 2. 195.—*P. murorum*, β. *miniata*, Fries L. Ref. 116.

δ. STEROPEUM, (*Ach.*) Thallus crustaceous, thin, indeterminate, granuloso-pulverulent, pale yellow. Apothecia small, scattered.

Parmelia murorum, var. *steropea*, Fries L. Ref. 115.—*Amphiloma murorum*, var. *steropeum*, Kbr. S. L. G. 111.

ε. CITRINUM, (*Ach.*) Thallus crustaceous, effuse, leproso-pulverulent, at length rimoso-subareolate, of a bright lemon-colour. Apothecia of a medium size, not very numerous, scattered, subinnate; disc plano-convex, yellowish-orange, surrounded by a pulverulent thallodal margin; asci oblong, 8 spored; spores elliptical, polari-bilocular, hyaline; ·003 in. long, by ·0015 in. broad.

Lichen citrinus, Ach. Prod.—Sm. E. Bot. 1793.—*Lecanora citrina*, Ach. Syn. 176.—Hook. Brit. Fl. 2. 192.—*P. murorum*, var. *citrina*, Fries L. Ref. 115.—*L. murorum*, var. Schær. Enum. 64.—*Placodium murorum*, var. *citrinum*, Hepp. Eur. 72 !—*Callopisma citrinum*, Kbr. S. L. G. 128.

On rocks and walls; common in limestone districts, and on the walls of old castles, abbeys, etc., but liable to considerable variation both in size and colour of its thallus. The varieties here enumerated are intimately connected together by intermediate states, and are clearly traceable to one common type. Their spermogones bear a general resemblance to each other, but their occurrence is not very common. They are minute, and difficult to detect, unless the thallus is moistened with a little water, papillæform, prominent, orange-red, solitary, or congregated together into groups of two or three. The spermatia are abundant, short, cylindrical, ·001 to ·00125 in. long, by ·00012 to ·00016 in. broad.

4. PLACODIUM CALLOPISMUM, (*Ach.*) Thallus adnate, orbicular, radioso-lobed, yellowish-orange, or orange-coloured; rimoso-areolate, or minutely lobed in the centre, inciso-lobed at the circumference, the lobes nearly flat, and more or less dilated. Apothecia of a medium size, numerous, sessile; disc plane or slightly convex, orange-coloured, surrounded by a thickish, flexuose, thallodal margin; asci cylindrico-clavate, 8 spored; spores oblong, or broadly-oblong, polari-bilocular, the poles considerably protruded beyond the oblong outline, hyaline: ·0025 to ·00325 in. long, by ·0015 in. broad. PLATE 2. *fig.* 42.

Lecanora callopisma, Ach. Lich. Univ. 437.—Schær. Enum, 63, L. H. 337!—*Par. murorum, γ. callopisma*, Fries Lich. Ref. 116.—*Placodium, callopismum*, Hepp. Eur. 197!—Nyl. Enum. Gen. 111, L. P. 36!—*Amphiloma*, Kbr. S. L. G. 112.

On rocks and walls. Near Edinburgh! Scotland, and Ardglass! County Down, Ireland, *Dr. Maingay.* Barmouth! North Wales, *Rev. T. Salwey.* Bilsdale! Yorkshire. The present species is closely allied to the normal form of *P. murorum*, and, I think, ought to be regarded as a variety of it, as it is only distinguished by its larger and more distinctly lobed thallus, larger apothecia, and their thicker and flexuose or crenulated margin. Its spermogones are similar to those of the preceding, but they are not often present. They are papillæform, prominent, orange-coloured, isolated, or grouped, mostly scattered about the periphery, or on sterile lobes. The sterigmata are short, articulated and somewhat branched. The spermatia are short, cylindrical, very numerous; ·00112 in. long, by ·00012 in. broad.

SECT. B. *Thallus glaucous, or greyish-white.*

5. PLACODIUM, CANDICANS, (*Dicks.*) Thallus adnate, tartareous, orbicular, squamuloso-radiated, glaucous, or greyish-white; rotundato-lobed at the circumference, areolate or subcontiguous in the centre. Apothecia small, not very numerous, scattered, appressed; disc slightly convex, pruinose, brown, or brownish-black, surrounded by a persistent thallodal margin; asci subclavate, 8 spored; spores elliptical-oblong, bilocular, hyaline; ·003 to ·00325 in. long, by ·001 in. broad.

Lichen candicans, Dicks.—Sm. E. Bot. 1778.—*Parmelia candicans*, Fries L. Ref. 123.—*Squamaria candicans*, Hook. Brit. Fl. 2. 195.—*Lecanora candicans*, Schær. Enum. 59.—*Amphiloma candicans*, Kbr. S. L. G. 113.—*Placodium candicans*, Nyl. Enum. Gen. 111, L. P. 117!—*Lecidea rimosa*, Leight. Exs. 218!

On limestone, or chalky rocks. Teesdale! Durham, *Rev. J. Harri-*

man. Great Ormes Head! Caernarvonshire, *Rev. W. A. Leighton.* St. Vincent Rocks! near Bristol, *Miss M. Atwood.* The specimens issued by the REV. W. A. LEIGHTON, in his Lichenes Britannici Exsiccati as *Lecidea rimosa,* are referrible to the present species. *L. rimosa,* is quite another plant. The spermogones are of common occurrence. They are minute, hardly visible without the aid of a lens, papillæform, semi-immersed, dark-brown or nearly black, isolated or congregated together into little groups, indiscriminately scattered, but most numerous towards the periphery of the thallus. The sterigmata are short and articulated, often scarcely discernible. The spermatia are very abundant, ellipsoid, or short cylindrical, ·00075 in. long, by ·00012 in. broad.

6. PLACODIUM CHALYBÆUM, (*Duf.*) Thallus adnate, tartareous, smooth, rimoso-areolate in the centre, radiato-striated at the circumference, whitish, or greyish lead-coloured; hypothallus brownish-black, often slightly extended beyond the thallus. Apothecia small, numerous, scattered or somewhat crowded, at first immersed in the thallus, afterwards emersed so as to be a little above its level; disc plane, when moist livid-brown, when dry black, naked, or pruinose, surrounded by a thin thallodal margin; asci clavato-subventricose, each containing 8 spores; spores elliptical, polari-bilocular, hyaline; the poles are often filled with a finely granular protoplasm; ·0025 to ·00275 in. long, by ·0015 in. broad.

Urceolaria chalybæa, Duf.—*Parmelia.* Fries L. Ref. 125.—*Lecanora.* Schær. Enum. 60, L. H. 566!—*Callopisma.* Kbr. S. L. G. 132.—*Placodium.* Hepp. Eur. 204!—Nyl. Enum. Gen. 111.

On calcareous rocks, in subalpine districts. On mountain-limestone, near Penhill! Yorkshire, *I. G. Baker, Esq.* Babbiecomb! Devonshire, *Admiral Jones.* For the addition of the present species to the British Flora, we are indebted to the researches of the gentlemen just named. It is very distinct from all its allies, and easily recognised by its rimuloso-areolate smooth greyish lead-coloured thallus, brownish-black persistent hypothallus, small immersed apothecia, and polari-bilocular spores. Its spermogones are not very plentiful; they are also difficult to detect, being very minute, and quite imperceptible to the eye when unassisted, and often nearly of the same colour as the thallus. They are punctiform, immersed, or slightly prominent, indiscriminately scattered over the superior face of the areolæ. The spermatia are usually not very abundant, but nevertheless numerous; they are short cylindrical, or ellipsoid; ·0005 to ·00075 in. long, by ·00012 in. broad.

SUBTRIBE 3. LECANORINEÆ

Thallus crustaceous, uniform. Apothecia scutelliform, or subpatellæform, margined by a thallodal exciple, a thallodal exciple which becomes converted into a proper exciple, or by a compound exciple.

GENUS 6. CALLOPISMA, (*De Not.*)

Apothecia at first closed, afterwards explanate, scutelliform, subpatellæform, or patellæform, margined by a simple thallodal exciple, or by a compound exciple; thalamium arising from a carnose or a carnosogelatinous hypothecium, which is placed upon the gonidiac stratum; asci clavate, oblong, or subventricose, 8, 24, or 32 spored; spores elliptical, or oblong, polari-bilocular, uncoloured. Thallus crustaceous. Hypothallus mostly white, subevanescent.

The species constituting the present genus are distinguished from those of *Placodium*, chiefly by their crustaceous thallus. The colour of the apothecia and internal organization of the spores, of the respective species in both genera are similar.

1. CALLOPISMA VITELLINUM, (*Ehrh.*) Thallus tartareous, effuse, granulated; bright greenish-yellow; granules more or less agglomerated, subareolate. Apothecia of a medium size, irregularly scattered, sessile; disc plane, tawny-yellow, becoming convex and rather darker coloured by age; margin entire, or granuloso-crenulated, composed of the same substance as the thallus, and of the same colour; asci oblongo-ventricose, or broadly clavate, 24 to 32 spored; spores oblong, polari-bilocular, or polari-bicellular, hyaline, or filled with a finely granular protoplasm; ·00275 to ·003 in. long, by ·001 in. broad.

Lichen vitellinus, Ehrh.—Sm. E. Bot. 1792.—*Lecanora vitellina*, Ach. Syn. 174.—Hook. Brit. Fl. 2. 192.—Schær. Enum. 80, L. H. 450!—Nyl. Enum. Gen. 112.—*Parmelia vitellina*, Fries L. Ref. 162.—*Placodium vitellinum*, and *P. vitel. β. areolatum*, Hepp. Eur 70! et 391!—*Candelaria vitellina*, Kbr. S. L. G. 121.

On rocks, walls, old pales, etc.; common. This species is well characterised by the number of spores in each ascus; but in other respects it is often difficult to distinguish it from the next species, and from states of *Placodium murorum*, var. *citrinum*. Its spermogones are, apparently, of rare occurrence. They are minute. solitary, and papillæform, or confluent and verrucæform, slightly prominent, dark-brown or black, sparingly scattered over the superior surface of the thallus. The spermatia are very numerous, ellipsoid, ·0005 in. long, by ·00016 in. broad.

2. CALLOPISMA VITELLINELLUM, *Mudd.* Thallus effuse, thin, granulose, greenish-yellow, or greenish-grey; often scarcely discernible. Apothecia small, numerous, often crowded, sessile; disc plane or slightly convex, greenish-yellow or yellowish-orange, surrounded by a thin, smooth, or subcrenulated thallodal margin; asci clavate, 8 spored; spores oblong, straight or somewhat curved, subpolari-bilocular, or bilocular, each loculus filled with a finely granular protoplasm, or hyaline; ·003 to ·0035 in. long, by ·001 in. broad.

On old posts and pales, and occasionally on the trunks of trees; but not common. Near Cork! Ireland, *I. Carroll, Esq.* The present species closely resembles, in its external aspect, the ordinary form of *vitellinum*. But it is separated from it, on account of its smaller and more numerous asci, and the number of spores contained in each.

3. CALLOPISMA CERINUM, (*Hedw.*) Thallus effuse, or sublimited, very thin, contiguous, greyish-white, becoming granulato-leprose, and often nearly imperceptible; hypothallus more or less distinct, thin, bluish-black. Apothecia of a medium size, scattered, sessile; disc slightly concave at first, afterwards plane, pale-yellow or wax-coloured, surrounded by a smooth inflexed thallodal margin, which is often undu-

lated in age; asci clavate, 8 spored; spores elliptical, polari-bilocular, the poles often connected by a longitudinal dissepiment or channel, hyaline; ·0025 in. long, by ·00125 in. broad.

Lichen cerinus, Hedw.—Sm. E. Bot. 627.—*Lecanora cerina*, Ach. Syn. 173.—Hook. Brit. Fl. 2. 190.—Nyl. Enum. Gen. 112.—*Parmelia cerina, a.* Fries L. Ref. 168.—Leight. Exs. 83 !—*Lecidea cerina, α.* and *γ.* Schær. Enum. 148, L. H. 219 !—*Placodium cerinum*, Hepp. Eur. 203. et 405 !—*Callopisma cerinum*, Kbr. S. L. G. 127.

β. CHLORINUM, (*Fw.*) Thallus effuse, thick, granuloso-areolate, becoming somewhat pulverulent, pale green or greenish-olive. Otherwise as above.

Callopisma cerinum, var. *chlorina*, Kbr. S. L. G. 127.

γ. STILLICIDIORUM, (*Oed.*) Thallus effuse, very thin, granulated, or leprous, greyish-white. Apothecia numerous, scattered, or crowded, sessile; disc yellowish-green, or olive-green, surrounded by a white undulated margin; spores broadly elliptical, polari-bilocular, hyaline; ·003 in. long, by ·002 in. broad.

Lichen stillicidiorum, Oed. Fl. Dan. t. 1063.—*Lichen chloroleucus*, Sm. E. Bot. 1373.—*Lecanora chloroleuca*, Ach. Syn. 160.—Hook. Brit. Fl. 2. 190.—*Parmelia cerina, β.* Fries L. Ref. 169.—*Lecidea cerina, β* Schær. Enum. 148.—*Callopisma cerinum, β.* Kbr. S. L. G. 127.—*Placodium cerinum, γ.* Hepp. Eur. 406 !

On the trunks of trees, old pales, rocks, and mosses. *α.* Not uncommon. *β.* On rocks near Newton ! Cleveland, Yorkshire. *γ.* On mosses, Teesdale ! Durham, *Rev. J. Harriman.* Limestone Ridge, Castleton ! Braemar, *Admiral Jones.* The spermogones of this species are very seldom met with; they are also very difficult to detect. They are exceedingly minute, and only visible by the aid of a good lens, papillæform, semi-immersed in the granules of the thallus, somewhat prominent, watery-brown when wet, dark-brown or nearly black when dry, solitary, indiscriminately scattered over the face of the thallus. The spermatia are very abundant, issuing in a dense cloud, ellipsoid; ·00025 in. long, by ·00012 in. broad; often almost atomic and unmeasurable. The apothecia are occasionally infested with a minute parasitic *fungus*, which somewhat resembles the spermogones in its external aspect, and to prevent their confusion I here insert a description of it. I call it provisionally, *Sphæria cerinaria* :—Perithecia extremely minute, punctiform, semi-immersed, black, isolated, 10 to 20, or more, seated on the disc of an apothecium; nucleus mucose, pale; paraphyses none; asci. . . . . . ? spores very numerous, oblong, slightly constricted in the middle, bilocular, pale yellow; ·0015 in. long, by ·00075 in. broad. Hab. parasitic on the apothecia of *Callopisma cerinum.* Near Ayton ! Cleveland, Yorkshire.

4. CALLOPISMA LUTEO-ALBUM, (*Turn.*) Thallus effuse, very thin, leprous, greyish-white. Apothecia minute, very numerous, often crowded, at first innate, afterwards sessile; disc at first plane, orange-coloured, surrounded by a thin smooth margin of the same colour, and occasionally by a very thin white accessory thallodal margin; afterwards convex, and immarginate; asci narrow, saccate, 8 spored; spores oblong, bilocular, or polari-bilocular, the poles often connected by a longitudinal dissepiment, hyaline; ·002 in. long, by ·001 in. broad.

Lichen luteo-albus, Turn. in Lin. Trans. 7. 92.—Sm. E. Bot. 1426.—

Parmelia cerina, b. *gilva*, Fries L. Ref. 168.—*Lecidea ulmicola*, Hook. Brit. Fl. 2. 185.—*Lecidea luteo-album*, a. Schær. Enum. 147, L. H. 475!—*Parmelia ulmicola*, Leight. Exs. 84!—*Placodium luteo-album*, Hepp. Eur. 202!—*Lecanora cerina*, var. *pyracea*, Nyl. L. P. 120!—*Callopisma luteo-album*, Kbr. S. L. G. 128.

β. HOLOCARPUM, *(Ehrh.)* Thallus effuse, very thin, granulato-leprous, greyish-black. Apothecia minute, often much crowded: disc plane, deep-yellow, or orange-coloured, surrounded by a smooth margin of the same colour; eventually convex, and immarginate; spores elliptical-oblong, polari-bilocular, hyaline; ·003 to ·0035 in. long, by ·00175 in. broad.

Lichen holocarpus, Ehrh.—*Lichen atro-flavus*, Sm. E. Bot. 2009.—*Lecidea atro-flava*, Hook. Fl. 2. 185.—*Lecidea luteo-album*, γ. *holocarpa*, Schær. Enum. 147.—*Placodium luteo-album*, γ. *holocarpum*, Hepp. Eur. 73!

On the trunks of old trees, especially Elms; not uncommon. β. *holocarpum*, on pales, old timber, and calcareous rocks; less frequent. Penzance! *Rev. T. Salwey*. Both the present species and variety are distinguished from all the forms of *C. cerina*, by their apothecia being smaller in size, much more numerous, more compacted together, of a brighter and deeper orange-colour, and by being surrounded by a proper margin. These characters being constant, I think, they are sufficient to justify the retention of *C. luteo-album*, as a distinct and separate species.

5. CALLOPISMA AURANTIACUM, *(Lightf.)* Thallus subdeterminate, thin, cartilaginous, somewhat granulated, greenish-yellow, or pale lemon-coloured. Apothecia of a medium size, numerous, sessile; disc plane, or slightly convex, orange-coloured, surrounded by a pale yellow, crenulated or undulated thallodal margin; asci oblongo-clavate, 8 spored; spores elliptical-oblong, polari-bilocular, hyaline, or subhyaline; ·0025 to ·003 in. long, by ·001 to ·0015 in. broad.

Lichen aurantiacus, Lightf. and Auct.

α. SALICINUM, *(Schrad.)* Thallus and apothecia as above.

Lichen salicinus, Shrad.—Sm. E. Bot. 1305.—*Lecanora salicina*, Ach. Syn. 175.—*Parmelia aurantiaca*, α. Fries L. Ref. 165.—*Lecidea aurantiaca*, Hook. Brit. Fl. 2. 186.—*Lecidea aurantiaca*, α. *salicina*, Schær. Enum. 149, L. H. 537!—*Biatora aurantiaca*, var. *salicina*, Leight. Exs. 212!—*Callopisma aurantiacum*, α. *salicinum*, Kbr. S. L. G. 129.—*Lecanora aurantiaca*, Nyl. Enum. Gen. 112.

β. FLAVOVIRESCENS, *(Hoffm.)* Thallus tartareous, rimoso-areolate, greenish-yellow. Apothecia innato-sessile, more or less crowded; disc at first plane, afterwards convex, orange-coloured; margin thin, smooth, and even, or undulated, nearly of the same colour as the disc, eventually obliterated. Spores as above.

Verrucaria flavovirescens, Hoffm.—*Parmelia aurantiaca*, b. Fries L. Ref. 166. in pt.—*Lecidea aurantiaca*, γ. Schær. Enum. 149, L. H. 223! —*Placodium aurantiacum*, γ. Hepp. Eur. 198.—*Callopisma aurantiacum*, β. Kbr. S. L. G. 130.

γ. INALPINUM, *(Schleich.)* Thallus very thin, granulated, pale-yellow. Apothecia minute, numerous, crowded, sessile; disc at first plane, deep orange-coloured, surrounded by a smooth paler margin; afterwards convex, the margin obliterated. Spores as above.

Lecidea inalpina, Schleich. (fide Hepp.)—*Lichen erythrellus*, Ach. Prod.—Sm. E. Bot. 1993.—*Parmelia aurantiaca*, β. *flavo-fusca*, Fries L. Ref. 167.—*Lecidea erythrella*, Hook. Brit. Fl. 2. 186.—*Biatora aurantiaca*, var. *erythrella*, Leight. Exs. 118!—*Placodium aurantiacum*, δ. *inalpinum*, Hepp. Eur. 399!

δ, RUBESCENS, (*Schær.*) Thallus leproso-tartareous, very thin, yellow, or greyish-brown, often evanescent. Apothecia small, numerous, scattered, sessile; disc plano-convex, dark orange-coloured, surrounded by a paler margin. Otherwise as above.

Lecidea aurantiaca, δ. *rubescens*, Schær. Enum. 149, L. H. 224!—*Lecidea picta*, Tayl. Fl. Hib. pt. 2. 130.

On the trunks of trees, rocks, stones, &c. α.—Common on Ash and other trees. β.—On rocks and walls, near Belfast! Ireland, *I. Carroll, Esq.* Near Roseberry! Cleveland. γ.—On rocks and walls, near Darlington, Durham; near Yarm! and on Langbraugh-rigg, Cleveland, Yorkshire. The varieties here enumerated are tolerably well characterised, and may be separated from each other without difficulty. The spermogones are of frequent occurrence, especially in the normal form. They are minute, imperceptible without the aid of a lens, papillæform, or verrucæform, semi-immersed, orange-red, or dark-brown, solitary, very numerous, indiscriminately scattered over the whole thallus, or only towards the circumference of it. The spermatia are very abundant, short, cylindrical, or subellipsoid; ·0005 to ·00075 in. long, by ·00016 to .00012 in. broad.

6. CALLOPISMA OCHRACEUM, (*Schær.*) Thallus thin, subdeterminate, tartareous, smooth, contiguous, pale lemon-yellow; hypothallus white. Apothecia minute, scattered, sessile; disc at first concave, afterwards plane, orange-coloured, surrounded by a thickish, entire, rather paler margin; asci subclavate, 8 spored; spores elliptical-oblong, polari-bilocular; poles at times connected by a longitudinal dissepiment; subhyaline, or hyaline; ·002 to ·0025 in. long, by ·00125 to ·0015 in. broad. PLATE 2, *fig.* 43.

Lecidea ochracea, Schær. in Nat. Anz. 1810. p. 11.—*L. aurantiaca*, β. *ochracea*, Schær. Enum. 149, L. H. 222!—*Parmelia ochracea*, Fries L. Ref. 164.—*Callopisma ochracea*, Kbr. S. L. G. 131.—*Lecanora ochracea*, Nyl. Enum. Gen. 112.

On calcareous rocks; rare. Malham Tarn! *S. Hailstone, Esq.* Kenmare! *I. Carroll, Esq.* Sheep Walk, Armagh! *Admiral Jones.* The present is a very elegant species, and may be recognised from all the states of the preceding one, its nearest ally, by its pale lemon-coloured, smooth, contiguous thallus, and by its small, scattered, concave apothecia.

7. CALLOPISMA ARENARIUM, (*Pers.*) Thallus rather thin, subdeterminate, granulated, greyish-white; at times somewhat lobed and crenate at the circumference; but most frequently forming a loose granuloso-pulverulent crust. Apothecia of a medium size, scattered, or congregated into little groups, innato-sessile; disc nearly plane, deep-orange, or tawny-red, surrounded by a thickish undulated and crenated margin of a rather paler colour; asci clavate, 8 spored; spores oblong, or elliptical, polari-bilocular; poles often filled with a more or less granular protoplasm, and connected together by a longitudinal

dissepiment; subhyaline, or hyaline; ·003 to ·004 in. long, by ·001 to ·0015 in. broad.

Lichen arenarius, Pers.—*Lichen cæsio-rufus*, Schrad.—Sm. E. Bot. 1040.—*Lecanora rubricosa*, Ach. Syn. 162.—*Parmelia erythrocarpia, b.* Fries L. Ref. 120.—*Lecan. cæsio-rufa*, Hook. Brit. Fl. 2. 189.—*Lecidea erythocarpia, a.* Schær. Enum. 145, L. H. 632!—*Placodium arenarium*, Hepp. Eur. 199!—*Blastenia erythrocarpea*, Kbr. S. L. G. 183.

On rocks and walls; not common. Authentic specimens from *Dickson!* in herb. *W. Brunton, Esq.* Maidstone! *Admiral Jones.* Near Shanklin! Isle of Wight, *H. Hyndman, Esq.*

8. Callopisma Lallavei, (*Clem.*) Thallus determinate, rather thick, tartareous, milk-white, areolate in the centre, somewhat lobed at the circumference. Apothecia small, more or less crowded, innate; disc nearly plane, blood-red, surrounded by a whitish evanescent thllodal margin; asci oblong, 8 spored; spores broadly elliptical, polari-bilocular; poles at times slightly bulged out beyond the elliptic outline; hyaline; ·003 to ·0035 in. long, by ·0015 to ·002 in. broad. Plate 2. *fig.* 44.

Lecidea Lallave, Clem.—Ach. Syn. 45.—*Parmelia erythrocarpia, β.* Fries L. Ref. 121.—*Lecidea erythro. β.* Schær. Enum. 145, L. H. 584!—*Blastenia Lallavei*, Kbr. S. L. G. 185.—*Lecan. Lallavei*, Nyl. Enum. Gen. 112.

On calcareous rocks; rare. Ireland! *Miss Hutchins*, in herb. *I. Carroll, Esq.* The present species may be distinguished from both the preceding one, and the following, by its white tartareous thallus.

9. Callopisma ferrugineum, (*Huds.*) Thallus at first subdeterminate, contiguous, afterwards effuse, leproso-verruculose, greyish-white or lead-coloured; hypothallus greyish-black. Apothecia small, numerous, indiscriminately scattered, sessile; disc plane, or convex, rusty-red, surrounded by a thin, slightly elevated, undulated margin of the same colour, asci oblongo-subventricose, 8 spored; spores elliptical, polari-bilocular; poles mostly filled with a finely granular protoplasm; subhyaline, or hyaline; ·003 to ·0035 in. long, by ·00175 to ·002 in. broad.

Lichen ferrugineus, Huds.—Sm. E. Bot. 1650.—*L. cinereo-fuscus*, Web.—*Parmelia ferrugineus*, Fries L. Ref. 170.—Leight. Exs. 85!—*Lecidea ferruginea*, Hook. Brit. Fl. 2. 184—Schær. Enum. 144, L. H. 448! et 583!—*Blastenia ferruginea*, Kbr. S. L. G. 183.—*Placodium ferrugineum, α. cinereo-fuscum*, Hepp. Eur. 400!

β. festiva, (*Ach.*) Thallus often wanting—when present, granulato-areolate, greyish-white. Apothecia small, numerous; disc orange-red or brownish-red, at first plane, afterwards convex, obliterating the margin. Spores oblong; otherwise as above.

Lecidea cæsio-rufa, var *festiva*, Ach. Syn. 44.—*Parmelia ferruginea, γ. festiva*, Fries L. Ref. 172.—*Lecidea ferruginea*, var. *festiva*, Schær. Enum. 144, L. H. 449!—*Placodium festivum*, Hepp. Eur. 201!

On rocks and stones, and on the trunks of trees; common in mountainous districts. The spermogones are not of uncommon occurrence. They are distinctly visible to the unassisted eye, papillæform, prominent, of a rusty-red-colour, solitary, indiscriminately scattered over the whole face of the thallus, or only about the circumference of it; ostiole rather large, slightly depressed; spermatia exceedingly numerous, ellipsoid, ·00025 to ·0005 in. long, by ·00012 in. broad.

Genus 7. Lecania, (*Massal.*)

Apothecia at first closed, afterwards scutelliform, margined by a thallodal exciple; at times cephaloid and subimmarginate; thalamium arising from a pale carnoso-subgrumous simple hypothecium; asci clavato-cylindrical, each containing 8 or 16 spores; spores elliptical, linear-oblong, or subfusiform, bilocular, or quadrilocular, uncoloured. Thallus crustaceous, effuse. Hypothallus white, evanescent.

1. Lecania carneo-lutea, (*Turn.*) Thallus indeterminate, extremely thin, smooth, white. Apothecia minute, numerous, depressed, at first closed, afterwards irregularly stellato-dehiscent; disc nearly plane, flesh-coloured, surrounded by an uneven white thallodal margin, eventually convex, the margin somewhat obliterated; asci 8 spored? spores oblong, their extremities rounded, or attenuated, quadrilocular, hyaline; ·00275 to ·0035 in. long, by ·001 in. broad.

Lichen carneo-luteus, Turn.—Sm. E. Bot. 2010.—*Lecanora carneo-lutea*, Ach. Syn. 171.—Hook. Brit. Fl. 191.—Schær. Enum. 80.—*Lecidea carneo-lutea*, Nyl. Enum. Gen 119.

On the trunks of trees, especially elms; not common. Sussex, and in the Isle of Wight.

2. Lecania fuscella, (*Schær.*) Thallus indeterminate, thin, leproso-verruculose, glaucous or greyish-white. Apothecia small, scattered, or congregated together into little groups, sessile; disc when young plane, watery-brown, cinereo-pruinose, surrounded by an entire white thallodal margin; when old convex, dark-brown, and nearly, or quite naked; asci cylindrico-clavate, 16 spored; spores elliptical, or oblong, straight, or slightly curved, quadrilocular, subhyaline, or hyaline; ·003 to ·0035 in. long, by ·001 in. broad. Plate 2. *fig.* 45.

Lecanora pallida, δ. *fuscella*, Schær. Enum. 78.—*Lecania fuscella*, Massal. Mem. 120.—Leight. Exs. 294!—Kbr. S. L. G. 122.—*Patellaria fuscella*, Hepp. Eur. 76!

On the trunks of trees, especially poplars; also on old walls. Abundant on old brick walls near Stokesley! Cleveland, Yorkshire. The present species resembles, very closely in its outward aspect, states of *Lecanora subfusca*, and unless its asci and spores are examined, it may be confounded with them. The spermogones are not commonly produced; they are also difficult to detect. They are minute, imperceptible to the naked eye, papillæform, slightly prominent, dark-brown, solitary, irregularly scattered over the surface of the thallus. Sterigmata simple, distinct. Spermatia numerous, very fine and delicate, anguillulæform; ·0035 to ·0045 in. long, by ·00008 in. broad.

3. Lecania cœrulescens, *Mudd.* Thallus effuse, thickish, granuloso-verrucose, rugulose, rimoso-areolate, leaden-grey, pruinose. Apothecia of a medium size, generally numerous and crowded, sessile; disc plane, pale brown, densely cœruleo-pruinose; margin at first thin and even, afterwards thicker, slightly elevated, and eventually undulated and somewhat angular through confluence, of the same colour as the thallus; asci broadly clavate, each containing 8 spores; spores oblong, or subfusiform, straight or slightly curved, quadrilocular, filled with a more or less granular protoplasm, subhaline, or hyaline; ·004 to ·005 in. long, by ·001 to ·00125 in. broad. Plate 2. *fig.* 46.

β. CŒRULEO-RUBELLA, *Mudd.* Thallus granuloso-pulverulent, bluish-grey. Apothecia scattered, innato-sessile; disc dark-red, cœruleo-pruinose, surrounded by a thin white, thallodal margin. Otherwise as above.

On old walls, &c. Near Marske! and Ayton! Cleveland, Yorkshire. The thick granulose thallus, densely-pruinose large apothecia, 8 spored asci, and the large spores, are the principal distinguishing characters of both the present species and variety. Their spermogones are not of uncommon occurrence, but they are very difficult to detect, as they are covered with a dense coat of pruina, similar to the apothecia. They are very minute, discernible with the aid of an ordinary lens, papillæform, more or less prominent, dark-brown, pruinose, solitary, scattered indiscriminately over the face of the thallus. Spermatia very numerous, anguillulæform, very fine and delicate; ·003 to ·004 in. long, by ·00012 in. broad. Sterigmata distinct, simple.

4. LECANIA ERYSIBE, (*Ach.*) Thallus effuse, somewhat thick, spongioso-tartareous, at first contiguous, afterwards granuloso-leprose, rimose, greyish-white. Apothecia small, numerous, scattered or crowded, at times conglomerate, at first innate, at length sessile; disc plane when young, convex when old, varying in colour from a very pale brown to dark-brown; margin thin, white, evanescent; asci clavate, 8 spored; spores linear-oblong, or elliptical-oblong, bilocular, subhyaline, or hyaline; ·002 to ·00275 in. long, by ·00075 to ·001 in. broad. PL. 2, *fig.* 47.

Lecidea luteola, var. *erysibe,* Ach. Syn. 41.—*Biatora erysibe,* Fries L. Ref. 271.—*Bilimbia erysibe,* Kbr. S. L. G. 213.—*Patellaria Rabenhorstii, β. erysibe,* Hepp. Eur. 409!—*Lecanora exigua,* Tayl. Fl. Hib. pt. 2. 133.—*Lecanora erysibe,* Nyl. Enum. Gen. 114.

β. RABENHORSTII, (*Hepp.*) Thallus granuloso-leprose, dull olive-green when wet, greyish-brown when dry. Apothecia small, numerous, scattered, innato-sessile; disc plano-convex, dark-brown. Otherwise as above.

Patellaria Rabenhorstii, Hepp. Eur. 75!

γ. AIPOSPILA, (*Borr.*) Thallus indeterminate, tartareous, coarsely granuloso-verrucose, rugged in the centre, smoother towards the circumference, brownish-grey. Apothecia small, numerous, innato-sessile on the granules; disc plano-convex, dark-brown, or nearly black; margin thin, entire. Otherwise as above.

Lecanora aipospila, Borr. in E. Bot. Supple. 2662. fig. 2.—Hook. Brit. Fl. 2. 187.

δ. CINEREOFUSCA, *Mudd.* Thallus effuse, very thin, granuloso-leprose, greyish-green when moist, greyish-brown when dry. Apothecia minute, very numerous, scattered, sessile; disc plane, pale watery-brown when moist, darker when dry, slightly pruinose, surrounded by a thin white margin; asci broadly clavate, 8 spored; spores linear-oblong, or elliptical-oblong, straight or slightly curved, bilocular, or containing one or more rounded pale-yellow nuclei, hyaline, or subhyaline; ·0025 to ·003 in. long, by ·001 in. broad. PLATE 2. *fig.* 48.

On rocks and walls, and occasionally on the barks of trees near the ground, α. On granite, near Dublin! *Dr. Taylor.* Co. Down! *Admiral Jones.* On rocks near Cork! and on trees near Castlemary! Ireland, *I. Carroll, Esq.* On old walls near Ayton! Cleveland.—β. On old walls near Redcar! Cleveland.—γ. Staples' Islands! Northumberland, ex. herb. *W. Borrer, Esq.* On rocks by the sea, Kinsale! Ireland, *I. Carrol, Esq.*—δ. On old walls near Ayton! Cleveland, Yorkshire. *L. aipospila*, Borr., only differs from the normal form of *L. erysibe*, by its thallus being rather thicker and more rugged. The spermogones of all the forms here described are of frequent occurrence, and are generally visible to the naked eye as minute points. They are minute, papillæform, slightly prominent, brownish-black, solitary, irregularly scattered over the rugosities of the thallus. The spermatia are numerous, very elegantly undulated, or curved, cylindrical, ·0035 to ·0045 in. long, by ·00016 in. broad.

GENUS 8. RINODINA, (*Ach.*)

Apothecia at first closed, tuberculiform, afterwards open, scutelliform, margined by a thallodal exciple; thalamium arising from a pale carnose simple hypothecium, placed upon the gonimous stratum; asci clavate, each containing 8 or 16 spores; spores elliptical-oblong, or oblong, at times slightly curved, bilocular, coloured, each loculus mostly containing a subquadrate or rounded paler nucleus. Thallus crustaceous, uniform, somewhat limited, or effuse. Hypothallus usually nearly black, at times obsolete.

1. **RINODINA SOPHODES**, (*Ach.*) Thallus effuse, thin, tartareous, granulato-verrucose, greenish-grey or greyish-brown. Apothecia minute, numerous, sessile; disc plane or slightly convex, at first brown, afterwards brownish-black, margin thin, white; asci subclavate, 14-16 spored; spores oblong, or subreniform, at times slightly constricted in the middle, bilocular, varying in colour from green to dark-brown; ·0025 to ·0035 in. long, by ·0015 to ·00175 in. broad.

Lichen sophodes, Ach. Prod. 67.—Sm. E. Bot. 1791 in pt.—*Lecanora sophodes*, Ach. Syn. 153.—Hook. Brit. Fl. 2. 188 in pt.—*Parmelia sophodes*, Fries L. Ref. 149 in pt.—*Lecanora sophodes*, Schær. Enum. 70, L. H. 314!—*Psora sophodes*, Hepp. Eur. 77!—*Rinodina sophodes*, Massal. Ric. 14.—Kbr. S. L. G. 122.—*Lecanora sophodes*, Nyl. Enum. Gen. 115.

On the trunks of trees, in mountainous woods. I have not yet seen British specimens of the present species, but I believe it will be found to occur; all the specimens which have been sent to me as *L. sophodes*, are referrible to the next species, which is distinguished from the present one, chiefly by the number of spores in each ascus.

2. **RINODINA EXIGUA**, (*Ach.*) Thallus effuse, or subdeterminate, thin, granulato-verrucose, or granulato-leprose, greyish-white. Apothecia small, numerous, more or less crowded, innato-sessile; disc plane, or slightly-convex, brownish-black, surrounded by a thin, white, thallodal margin; asci oblongo-clavate, 8 spored; spores elliptical-oblong, or subreniform, bilocular, each loculus occasionally containing a pale rounded nucleus, varying in colour from light-green to dark-brown; ·003 to ·00375 in. long, by ·0015 to 00175 in. broad.

Lichen exiguus, Ach. Prod.—Sm. E. Bot. 1849.—*Lecanora exigua*, Hook. Brit. Fl. 2. 187.—*Parmelia sophodes, c. exigua*, Fries. L. Ref. 149,—*Lecanora atra, β. exigua*, Schær. Enum. 72, L. H. 569!—*Rino-*

dina exigua, Massal. Ric. 15.—*Psora exigua,* Hepp. Eur. 207 !—*Rinodina metabolica,* Kbr. S. L. G. 123 in pt.—*Parmelia sophodes,* Leight. Exs. 146 !

On rocks, tiled roofs, old pales, and on the trunks of trees ; common. The specimen issued by the *Rev. W. A. Leighton,* in his Lich. Brit. Exs. as *P. sophodes,* Ach., from the number of spores in each ascus, is referrible to the present form.

β. METABOLICA, (*Ach.*) Thallus effuse, thickish, granuloso-leprose, greyish-brown, or dark-brown. Apothecia of a medium size, numerous, innate ; disc plane or convex, nearly black, or black, surrounded by a thickish thallodal margin ; asci oblongo-clavate, 8 spored ; spores oblong, bilocular, or irregularly bilocular, at times slightly constricted in the middle, dark-green, or brown ; ·005 to ·006 in. long, by ·0025 to ·003 in. broad.

Lecanora metabolica, Ach. Syn.—*Parmelia sophodes, c. exigua,* Fries L. Ref. 149 in pt.—*Rinodina metabolica,* Kbr. S. L. G. 123 in pt.

On rocks and stones, in damp situations ; common. This form is distinguished from the preceding one, by its thicker and darker coloured thallus, and by its larger spores. Its spermogones are not of uncommon occurrence, but they are very difficult to distinguish, even with the assistance of a good lens. They are very minute, punctiform, or papillæform, slightly prominent, brownish-black, irregularly scattered over the surface of the thallus. The spermatia are very abundant, straight, cylindrical, ·001 in. long, by ·00012 in. broad.

γ. HORIZA, (*Flw.*) Thallus determinate, suborbicular, areolato-verrucose, olive-brown ; hypothallus black. Apothecia of a medium size, innato-sessile, centrical ; disc plane, brownish-black, surrounded by a thallodal margin ; asci oblongo-clavate, 8 spored ; spores oblong, bilocular, varying in colour from green to dark-brown ; ·0025 to ·003 in. long, by ·0015 to ·00175 in. broad.

Zeora horiza, Flw. L. Fl. 32.—*Psora horiza,* Hepp. Eur. 410 !—*Rinodina albana, β.* Massal. Ric. 16. fig. 22.—*R. albana,* Kbr. S. L. G. 124.

On the trunks and branches of ash, and other trees. Near Ayton ! Cleveland. The present form is apparently only a state of *exigua.* Its principal distinguishing features are, the colour of its thallus and determinate habit, and its black hypothallus, which usually surrounds the thallus at its circumference, in the form of a narrow black line.

δ. PERICLEA, (*Ach.*) Thallus very thin, leproso-squamulose, white ; squamules scattered, smooth, plane or slightly convex. Apothecia rather small, subinnate ; disc black, somewhat convex and rugulose, surrounded by a thin, very white, eventually pulverulent margin ; spores oblong, or subellipsoid, bilocular, pale-green, or brown ; ·005 to ·006 in. long, by ·002 to ·00275 in. broad.

Lichen pericleus, Ach. Prod.—Sm. E. Bot. 1850.—*Lecanora periclea,* Hook. Brit. Fl. 2. 187.—Tayl. Fl. Hib. pt. 2. 133.

On rocks and stones, and at times on the trunks of trees. On rocks Derriquin ! County of Kerry, *Dr. Taylor.* This form evidently belongs to *exigua.* Its very white thallus, black apothecia, subpulverulent white margin, and its large spores, are its principal distinguishing characters.

3. RINODINA ATROCINEREA, (*Dicks.*) Thallus somewhat determinate, squamuloso-areolate, or granulato-areolate, smooth, greyish-white, or pale-brown; hypothallus black, persistent. Apothecia of a medium size, numerous, sessile; disc plane, or slightly turgid, brownish-black when wet, black when dry, surrounded by a rather thin thallodal margin; asci broadly clavate, 8 spored; spores oblong, or elliptical-oblong, bilocular, each loculus often containing a pale subquadrate nucleus, varying in colour from pale-green to dark-brown; ·004 in. long, by ·00175 to ·00225 in. broad. PLATE 2. *fig.* 49.

Lichen atrocinereus, Dicks.—Sm. E. Bot. 2096.—*Parmelia atrocinerea,* Fries L. Ref. 151.—*Lecidea atrocinerea,* Hook. Brit. Fl. 2. 174.—*Lecanora sophodes,* var. *atrocinerea,* Nyl. Enum. Gen. 115, L. P. 43 !—*Rinodina atrocinerea,* Kbr. S. L. G. 125.—*Psora atrocinerea,* Hepp. Eur. 412 !

On rocks and stones. Near Aberdeen ! *Professor Dickie.* Lough-na-Cat ! *Admiral Jones.* Ardglass ! Co. Down, *Dr. Maingay,* Pass of Rein-an-Eigh ! Co. Cork, *I. Carroll, Esq.*

GENUS 9. LECANORA, (*Ach.*)

Apothecia at first closed, tuberculiform, afterwards open, scutelliform, margined by a thallodal exciple; thalamium ceraceo-cartilaginous, arising from a pale, or pale carnose, simple hypothecium; asci clavate, or saccate, each containing 8 spores; spores ovate, or elliptical-oblong, unilocular, uncoloured. Thallus crustaceous, uniform; hypothallus various.

1. LECANORA BADIA, (*Pers.*) Thallus cartilaginous, rimoso-areolate, subsquamulose, olive-brown or pitch-black; hypothallus thin, black. Apothecia small, appressed, numerous, often crowded; disc plane, polished, brown, or brownish-black, surrounded by an entire persistent thallodal margin; asci subclavate, 8 spored; spores oblong, or ellipticofusiform, unilocular, hyaline; ·00225 in. long, by ·0005 in. broad. PL. 2, *fig.* 50.

Lichen badius, Pers.—*Lecanora badia,* Ach. Syn. 154.—Massal. Ric. 1. fig. 1.—Nyl Enum. Gen. 115, L. P. 42 !—*Parmelia badia,* Fries L, Ref. 147.—Leight. Exs. 206 !—*Lecanora badia, α. major,* Schær. Enum. 68, L. H. 301 !—Hepp. Eur. 181 !—*L. badia,* a. *vulgaris,* Kbr. S. L. G. 138.

On rocks and stones in alpine districts. Ingleborough ! *Dr. Carrington.* Battersby Moor ! Ayton Moor ! and on the top of Roseberry ! Cleveland. Yorkshire. The spermogones of the present species are not of unfrequent occurrence, but they are rather difficult to detect, on account of the dark colour of its thallus. They are very minute, at first punctiform and wholly immersed, afterwards subpatellæform and slightly prominent, often surrounded by a thin thallodal ring, isolated, scattered, or congregated together into irregular groups on the sterile areolæ, to which they give a rugose character. The spermatia are abundant, cylindrical, straight, ·00175 to ·00225 in. long, by ·00016 in. broad.

2 LECANORA MILVINA, (*Wahlb.*) Thallus tartareous, thinnish, rimoso-areolate, cream-coloured when moist, greyish-brown when dry; areolæ tumid, somewhat dispersed towards the circumference, crowded and angular in the centre; hypothallus filmy, brownish-black. Apothecia

minute, numerous, scattered, innato-sessile; disc at first slightly concave, afterwards plane, chestnut-brown, or dark-brown, surrounded by a smooth thallodal margin; asci very numerous, clavate, 8 spored; spores oblong, or ovate, unilocular, subhyaline, or hyaline; ·0035 to ·004 in. long, by ·00125 to ·00175 in. broad.

Lichen milvinus, Wahlb. Fl. Lapp. 410.—*Lecanora milvina*, Ach. L. Univ. 358.—Borr. in E. Bot. Suppl. 2662. f. 1.—Hook. Brit. Fl. 2. 187.—Tayl. Fl. Hib. pt. 2. 134.—*Parmelia badia, β. milvina,* Fries L. Ref. 148.—*Lecanora badia, β.* Kbr. S. L. G. 138.

On siliceous rocks; Carig Mountains! County Kerry, Ireland, *Dr. Taylor.* Its spermogones are apparently common. They are very minute, punctiform, slightly depressed, immersed in the areolæ, but when moistened with water, emersed so as to be on a level with the thallus, pale brown, solitary. The spermatia are very abundant, short, cylindrical, straight, ·001 in. long, by ·00016 in. broad. This species somewhat resembles the preceding one, and is regarded by some Lichenists as a variety of it. I consider them distinct. The paler coloured thallus, larger spores, minute depressed spermogones, and the short spermatia, are its distinguishing characters.

3. Lecanora frustulosa, (*Dicks.*) Thallus tartareous, glebuloso-squamulose, yellowish-white; glebules at first dispersed, afterwards somewhat lobed, crowded and slightly imbricated; hypothallus thin, black. Apothecia small, numerous, scattered, sessile; disc plano-convex, dark-brown, or nearly black, surrounded by a rather thick, subcrenulated, persistent thallodal margin; asci subclavate, 8 spored; spores elliptical-oblong, unilocular, subhyaline, or hyaline; ·0025 in. long, by ·001 in. broad.

Lichen frustulosus, Dicks, Crypt. Fasc. 3. 13. tab. 8. fig. 10.—Sm. E. Bot. 2273,—*Lecanora frustulosa,* Ach. Syn. 159.—Hook. Brit. Fl. 2. 189.—Schær. Enum. 56.—Massal. Ric. 10. fig. 15.—Kbr. S. L. G. 139.—Nyl. Enum. Gen. 114.—*Parmelia frustulosa,* Fries L. Ref. 141.

On micaceous rocks in alpine districts. Ben Lawers! *Dr. Maingay.* The spermogones of this species are usually present. They are minute, punctiform, wholly immersed in the glebules, solitary, dark-brown, rather distantly scattered, or two or three congregated together. Spermatia very abundant, cylindrical, elegantly curved, or flexuose, ·0045 to ·005 in. long, by ·00016 in. broad.

4. Lecanora atra, (*Huds.*) Thallus determinate, tartareous, granulato-verrucose, glaucous-white, or grey; hypothallus thin, often presented as a narrow, serpentine or undulated black line around the circumference of the thallus. Apothecia of a medium size, often very numerous, and much crowded, sessile; disc plane, or slightly convex, more or less polished, deep-black, surrounded by an entire, or somewhat crenulated, persistent thallodal margin; asci clavate, 8 spored; spores elliptical-oblong, or ovate, unilocular, filled with a finely granular protoplasm, subhyaline; ·003 to ·004 in. long, by ·00175 in. broad.

Lichen ater, Huds.—Sm. E. Bot. 949.—*Parmelia atra,* Fries L. Ref. 141.—Leight. Exs. 52!—*Lecanora atra,* Ach. Syn. 146.—Hook. Brit. Fl. 2. 186.—Schær. Enum. 72, L. H. 307!—Massal. Ric. 4.—Hepp. Eur. 182!—Kbr. S. L. G. 139.—Nyl. Enum. Gen. 114.

On rocks and walls, and on the trunks of trees; very common. Its spermogones are commonly present on good specimens. They are very minute, at first wholly immersed in the thallodal verrucæ, punctiform, black, afterwards more or less prominent, and surrounded by a thallodal ring, solitary, scattered, or grouped. The spermatia are exceedingly beautiful and abundant, often issuing in a dense cloud; they are cylindrical, elegantly curved, frequently assuming the figure of a horse-shoe, or flexuose, ·005 to ·006 in. long, by ·00016 in. broad.

5. LECANORA SUBFUSCA, (*L.*) Thallus tartareo-cartilaginous, at first contiguous, smooth, afterwards rimulose, and colliculoso-verrucose, glaucous-white, or grey; hypothallus white. Apothecia of a medium size, numerous, sessile; disc plano-convex, chestnut-coloured, or reddish-brown, surrounded by an entire, or somewhat crenated, persistent, thallodal margin; asci subclavate, 8 spored: spores elliptical-oblong, or ovate, unilocular, filled with a finely granular protoplasm, which is mixed, more or less, with minute oily globules, subhyaline; ·0025 to ·003 in. long, by ·00125 in. broad.

Lichen subfuscus, L.—Sm. E. Bot. 2109.—*Parmelia subfusca, α. discolor*, Fries L. Ref. 137.—Leight. Exs. 115!—*Lecanora subfusca*, Ach. Syn. 157.—Hook. Brit. Fl. 2. 189.—Massal. Ric. 5.—Nyl. Enum. Gen. 114.—*L. subfusca, α. vulgaris*, Schær. Enum. 73, L. H. 308!—Hepp. Eur. 183!—Kbr. S. L. G. 140.

On the trunks of trees, old pales, etc.; common. Its spermogones are of common occurrence. They are minute, punctiform, or subpapillæform, dark-brown, solitary, immersed in the thallodal verrucæ. Spermatia abundant, issuing in a dense cloud, cylindrical, elegantly curved, or flexuose, ·0045 to ·0055 in. long, by ·00012 in. broad.

β. DISTANS, (*Ach.*) Thallus determinate, thin, granuloso-verrucose, greyish-white. Apothecia of a medium size, numerous, sessile; disc plane, or tumid, pale brown, at first pruinose, afterwards naked; margin entire or crenulated. Otherwise as above.

Lecanora subfusca, β. distans, Ach. Meth. 168.—Schær. Enum. 74.—Hepp. Eur. 379!—*Patellaria populicola*, DC. Fl. Fr. 363.—*Parmelia subfusca, β. distans*, Fries L. Ref. 139.—Leight. Exs. 116!—*Lecanora subfusca*, var. *allophana*, Kbr. S. L. G. 141.

On the trunks of trees, especially poplars; common.

γ. GLABRATA, (*Ach.*) Thallus submembranaceous, smooth and equal, or minutely granuloso-verrucose, greyish-white. Apothecia small, numerous, scattered, sessile; disc plane, pale brown, surrounded by an entire thallodal margin; spores as above.

Lecanora subfusca, γ. glabrata, Ach. L. Univ. 393.—Schær. Enum. 74, L. H. 309!—Kbr. S. L. G. 140.

On the smooth bark of young trees, especially Oaks; common. Its spermogones are not commonly produced. They are minute punctiform, dark-brown, surrounded by a thin thallodal ring, irregularly scattered over the surface of the thallus, but mostly on that part of it which is destitute of apothecia. Its spermatia and sterigmata are similar to those of the normal form.

δ. PINASTRI, (*Schær.*) Thallus thin, somewhat leprose, pale yellow, becoming greyish-white. Apothecia small, scattered, sessile; disc plane, or tumid, brown, surrounded by an entire margin. Otherwise as above.

Lecanora subfusca, var. *pinastri*, Schær. Enum. 74, L. H. 310!—Massal. Ric. 7.—Hepp. Eur. 184!—Kbr. S. L. G. 141.

On the trunks and branches of Firs; common.

ε. ATRYNEA, (*Ach.*) Thallus areolato-verrucose, greyish-white, or pale brown. Apothecia rather large, numerous, often crowded; disc plane, chestnut-brown, or brownish-black, surrounded by a crenulated or flexuose thallodal margin; spores as above.

Ach. L. Univ. 385.—*Lecanora subfusca*, var. *atrynea*, Schær. Enum. 75.—Massal. Ric. 5.—Hepp. Eur. 380!

On old boarded buildings, pales, &c., and occasionally on rocks; frequent. Its spermogones are immersed in the thallodal verrucæ, and bear a general resemblance to those of the normal form.

ζ. CAMPESTRIS, (*Schær.*) Thallus granuloso-verrucose, greyish-white or grey. Apothecia of a medium size, often crowded; disc plano-convex, chestnut-coloured, or dark-brown, surrounded by an entire, or slightly crenulated, margin. Otherwise as above.

Lecanora subfusca, var. *campestris*, Schær. Enum. 75.—Hepp. Eur. 63!

On rocks and stones; common. Its spermogones and spermatia are similar to those of the normal form.

η. LAINEA, (*Ach.*) Thallus smooth, rimuloso-areolate, glaucous-white, or cream-coloured. Apothecia minute, scattered; disc plane, naked, brownish-black, or black; margin entire; spores as above.

Lecanora lainea, Ach. Syn. 147.—*Parmelia subfusca*, var. *lainea*, Fries L. Ref. 140.—*Lecanora subfusca*, var. *leucopis*, Schær. Enum. 74 (excl. *L. punctatus*, Sm. E. Bot. 450.)—Massal. Ric. 6.—Hepp. Eur. 381!—*L. subfusca*, var. *lainea*, Kbr. S. L. G. 141.—Nyl. Enum. Gen. 114.

On moist rocks and stones, chiefly near the sea. Ardglass! Co. Down, Ireland, *Dr. Maingay*. Near Cork Harbour! *I. Carroll, Esq.* Its spermogones are apparently common. They are indiscriminately scattered over the surface of the thallus, very minute. punctiform, wholly immersed; ostiole brownish-black, somewhat polished and shining. The spermatia are abundant, auguillulæform, very fine and delicate, ·004 to ·005 in. long, by ·00012 in. broad.

ι. EPIBRYON, (*Ach*) Thallus leproso-verruculose, creamy-white. Apothecia rather large, or of a medium size, numerous, often crowded; disc plane, chestnut-brown, naked, or slightly pruinose, surrounded by a thick, entire or crenulated thallodal margin. Otherwise as above.

Lecanora epibryon, Ach.—*L. subfusca*, var. *hypnorum*, Schær. Enum. 75, L. H. 311!—Massal. Ric. 7.—*L. hypnorum*, Hepp. Eur. 185.—*L. subfusca*, var. *bryontha*, Kbr. S. L. G. 141.

On the ground in turfy places, and on decayed mosses, &c. Ireland! *Professor Dickie*. Guisbro' Moor! Cleveland, Yorkshire. Its spermogones and spermatia, are similar to those of the normal form. The whole of these varieties, bear a general resemblance to each other, and are all more or less connected together by intermediate states.

6. LECANORA ALBELLA, (*Pers.*) Thallus determinate, thin, membranaceo-cartilaginous, smooth and equal, or somewhat leprose and

rugulose, white, or cream-coloured; hypothallus white. Apothecia of a medium size, numerous, scattered, sessile; disc at first concave, afterwards plane, or convex, pale buff-coloured, white-pruinose; margin thin, entire, white, eventually evanescent; asci narrow, clavate, 8 spored; spores elliptical-oblong, or ovate, unilocular, subhyaline, or hyaline; ·002 to ·0025 in. long, by ·001 in. broad.

Lichen albellus, Pers.—Sm. E. Bot. 2154.—*Lecanora albella*, Ach. Syn. 168.—Hook. Brit. Fl. 2. 191.—*Parmelia subfusca*, var. *albella*, Fries L. Ref. 139.—*Lecanora pallida*, a. *albella*, Schær. Enum. 78, L. H. 315!—Hepp Eur. 187!—Massal. Ric. 8.—Kbr. S. L. G. 145.—*L. subfusca*, var. *albella*, Nyl. Enum. Gen. 114.

On the trunks of trees, old pales, and occasionally on rocks; not very common. On rocks, Aviemore! *Admiral Jones.* On trees, Stanstead Park! Essex, *Mr. R. Jacob.* On old pales, near Ayton! Cleveland, Yorkshire. Both this and the following forms, are intimately allied to *L. subfusca*, and possibly, may be varieties of it. I retain them as distinct, on account of the constancy of their characters.

β. ANGULOSA, (*Ach.*) Thallus determinate, thin, equal, or ruguloso-verruculose, greyish-white. Apothecia of a medium size, numerous, crowded, often anguloso-difformed; disc plano-convex, livid, or livid-brown, glauco-pruinose; margin thin; crenulated, at length somewhat evanescent; spores oblong, or ovate; ·003 in. long, by ·00125 to ·0015 in. broad.

Lichen angulosus, Ach. Prod. 54.—*Parmelia subfusca*, var. *angulosa*, Fries L. Ref. 139.—*Lecanora pallida*, var. *angulosa*, Schær. Enum. 78, L. H. 540!—Massal. Ric. 9.—Kbr. S. L. G. 145.

On the smooth bark of trees, and occasionally on old pales; common. The spermogones of the present form are tolerably common. They are usually scattered towards the periphery of the thallus, and are presented to the eye as very minute, dark-brown dots, surrounded with a white thallodal ring. The body of the spermogone is wholly immersed in the tissue of the thallus; the ostiole alone being visible. The sterigmata and spermatia are similar to those of *subfusca*, the former being simple, and the latter curved or flexuose, ·004 to ·005 in. long, by ·00012 in. broad.

γ. HAGENI, (*Ach.*) Thallus indeterminate, very thin, subcartilaginous, leprose, glaucous, or greyish-white; often obsolete. Apothecia small, numerous, often crowded; disc plane, at length tumid, livid, pale brown, or dark-brown, naked or pruinose, surrounded by a thin, crenulated, persistent, white, margin; spores as in *angulosa*.

Lecanora hageni, Ach. Syn. 167.—Hepp. Eur. 64! et 66!—Kbr. S. L. G. 143.—Nyl. Enum. Gen. 114.—*Parmelia stellaris*, var. *cærulescens*, Schær. Enum. 40.—*Lecanora umbrina*, var. *Hageni*, Massal. Ric. 11.

On dead wood, old pales, &c.; frequent The present form somewhat resembles the preceding one in habit, and general appearance. It is distinguished from it, by its very thin thallus, which is at times nearly or altogether wanting, and by its smaller and less crowded apothecia.

δ. CRENULATA, (*Dicks.*) Thallus indeterminate, thin, granulose, dispersed, greyish-white. Apothecia minute, numerous, more or less scattered, sessile; disc plane, brownish-grey, or pale-brown, surrounded by a crenulated white margin; asci clavate, 8 spored; spores oblong, or ovate, unilocular, hyaline, ·0025 in. long, by ·001 in. broad.

Lichen crenulatus, Dicks.—Sm. E. Bot. 930.—*Lecanora crenulata*, Hook. Brit. Fl. 2. 190.—*Lecanora subfusca*, var. *crenulata*, Schær. Enum. 75.—Massal. Ric. 7.—*L. Hageni*, var. *crenulata*, Hepp. Eur. 65! Nyl. Enum. Gen. 114, L. P. 123!

On rocks and stones; common. The present form may be distinguished, by its very thin thallus, scattered, minute apothecia, and their conspicuous, crenulated, white, thallodal margin.

7. LECANORA GALACTINA, (*Ach.*) Thallus subtartareous, verrucoso-rugulose, smooth, or slightly pulverulent, cream-coloured, or white; often somewhat lobed at the circumference. Apothecia rather large, or of a medium size, numerous, crowded, often anguloso-difformed, sessile; disc plane, pale flesh-coloured, white-pruinose, surrounded by a crenulated, or angular, persistent, white thallodal margin; asci narrow clavate, 8 spored; spores oblong, or ovate, unilocular, subhyaline, or hyaline; ·003 in. long, by ·00125 in. broad,

Parmelia galactina, Ach. Meth. 190.—*P. saxicola*, d. *galactina*, Fries L. Ref. 111.—*Lecanora muralis*, var. *galactina*, Schær. Enum. 67.—*Placodium albescens*, Massal. Ric. 25. fig. 39.—*Lecanora galactina*, Hepp. Eur. 180!—Kbr. S. L. G. 145.

On rocks and walls; frequent. This species may be recognised by its white, somewhat lobed, and slightly pulverulent thallus, its luxuriant pale flesh-coloured apothecia, and their conspicuous, crenulated, white margin. Its spermogones are neither commonly produced, nor easily detected. They are chiefly distributed towards the circumference of the thallus, and are immersed in very minute papillar elevations, the apices of which are irregularly fissured, and thrown back, constituting a kind of margin or rim round the ostiole, which is pale brown, and white pruinose. The spermatia are cylindrical, elegantly curved, or flexuose, ·0035 to ·0045 in. long, by ·00012 in. broad.

β. DISPERSO-AREOLATA, (*Schær.*) Thallus very thin, often wanting, disperso-areolate, glaucous-green, or grey; areolæ tumid, subrugulose, and more or less white-pulverulent. Apothecia of a medium size, scattered, sessile; disc plane, waxy, pale yellowish flesh-coloured, surrounded by an elevated, flexuose, crenulated, white margin; spores elliptical-oblong, unilocular, hyaline; ·0025 to ·003 in. long, by ·001 in. broad.

Lecanora muralis, var. *disperso-areolata*, Schær. Enum. 66, L. H. 333!—*Placodium saxicolum*, var. *disperso-areolatum*, Massal Ric. 24. —*Placodium disperso-areolatum*, Kbr. S. L. G. 117.

On rocks in alpine districts. Battersby Bank! and Carlton Bank! Cleveland, Yorkshire. This form somewhat resembles states of *L. polytropa;* it may be, however, always distinguished from them, by the white thallodal margin of its apothecia.

8. LECANORA VARIA, (*Ehrh.*) Thallus indeterminate, subcartilaginous, areolato-verrucose, smooth, greenish-yellow, or straw-coloured. Apothecia small, numerous, often very much crowded and anguloso-difformed, sessile; disc plane, naked, yellowish flesh-coloured, or livid, surrounded by a crenulated, or flexuose, persistent thallodal margin; asci narrow

clavate, 8 spored; spores elliptical-oblong, or ovate, unilocular, often containing one or more rounded pale yellow nuclei, hyaline; ·002 to ·0025 in. long, by ·001 in. broad.

Lichen varius, Ehrh.—Sm. E. Bot. 1666.—*Lecanora varia*, Ach. Syn. 161.—Hook. Brit. Fl. 2. 190.—Massal. Ric. 13. fig. 21.—Kbr. S. L. G. 146.—Nyl. Enum. Gen. 114.—*Parmelia varia*, Fries L. Ref. 156.—Leight. Exs. 51!—*L. varia*, *α. pallescens*, Schær. Enum. 82, L. H. 325!—Hepp. Eur. 190!

On old timber, posts, pales, &c., frequent. Its spermogones are not uncommon. They are immersed in minute prominent thallodal verrucæ, dark-brown, or nearly black, often surrounded by a pale rim. The spermatia are very abundant, cylindrical, elegantly curved, or flexuose; ·005 to ·006 in. long, by ·0001 in. broad.

β. SARCOPSIS, (*Wahlb.*) Thallus effuse, thin, granulose, dull straw-coloured, or grey. Apothecia small, numerous, scattered; disc plane or tumid, pale-brown, surrounded by a thin, entire, or crenulated, pale margin; spores as above.

Parmelia sarcopis, Wahlb.—*Lecanora varia*, var. *sarcopis*, Schær. Enum. 82. L. H. 544!—Massal. Ric. 14.—Kbr. S. L. G. 147.

On dead wood, old paling, &c. frequent. This differs from the preceding, chiefly by the colour of its apothecia.

γ. AITEMA, (*Ach.*) Thallus effuse thin, granuloso-leprose, greenish-yellow, or greyish-white. Apothecia minute, more or less scattered; disc plano-convex, from pale-brown becoming livid-black; margin thin, eventually evanescent; spores oblong, unilocular; ·001 to ·0015 in. long, by ·0005 in. broad.

Lecidea aitema, Ach. L. Univ. 178.—*Parmelia varia*, *c. sæpincola*, Fries L. Ref. 156.—*L. varia*, var. *aitema*, Schær. Enum. 83.—Kbr. S. L. G. 147.—*L. aitema*, Hepp. Eur. 69!—*Lichen dubius*, Sm. E. Bot. 2547.—*Lecidea dubia*, Hook. Brit. Fl. 2. 176.

On old timber, and on the rough scaly bark of Scotch firs, &c.; not unfrequent in mountainous districts.

δ. OROSTHEA, (*Sm.*) Thallus effuse, thin, pulverulent, greenish sulphur-coloured. Apothecia small, sparingly produced, scattered, or congregated together into groups, innato-sessile; disc plane, or tumid, pale buff, or nearly of the same colour as the thallus; margin thin, pulverulent, eventually obliterated; spores oblong, or ellipsoid; ·003 in. long, by ·00075 in. broad.

Lichen orostheus, Sm. E. Bot. 1549.—*Lecidea expallens*, Hook. Brit. Fl. 2. 181.—*Parmelia varia*, Fries L. Ref. 156 in pt.

On the trunks of trees, old pales, &c., common. This form may be readily recognised, by its sulphur-coloured pulverulent thallus.

ε. SYMMICTA, (*Ach.*) Thallus maculiform, thin, subcartilaginous, granuloso-verruculose, or smooth and equal, greenish-yellow, or straw-coloured. Apothecia small, central, numerous, crowded; disc at first plane, afterwards tumid and convex, pale buff; margin thin, soon obliterated; spores elliptical or subfusiform, unilocular, at times sub-bilocular, subhyaline, or hyaline; ·003 to ·0035 in. long, by ·00075 in. broad.

Lecanora symmicta, Ach.—*Parmelia varia, b. symmicta,* Fries L. Ref. 156.—*Lecanora varia*, var. *maculiformis,* Schær, Enum. 83 in pt. —*L. maculiformis*, Hepp. Eur. 68 !

On the trunks of trees, old paling, &c.; frequent. The present form is distinguished from the preceding one, by its macular or determinate habit, its smoother thallus, and by its more numerous and convex apothecia. Its spermogones are not of uncommon occurrence. They are exceedingly minute, punctiform, immersed, livid-black, sparingly scattered over the whole surface of the thallus, but they are more numerous toward its periphery. The sterigmata and spermatia are similar to those of the normal form.

ζ. DENIGRATA, (*Fries*). Thallus effuse, or subdeterminate, leproso-granulose, pale greenish-yellow. Apothecia small, numerous, innate; disc plano-convex, livid-black, or black; margin thin, irregular, soon disappearing; spores as in *symmicta.*

Biatora denigrata, Fries L. Ref. 270.—Kbr. S. L. G. 199.—*Lecanora varia,* var. *denigrata,* Schær. Enum. 83, L. H. 327!

On the trunks of trees, squarred timber, old paling, &c.; common. The leproso-granulose thallus, and the small, innate, convex or tumid, black apothecia, are the principal characters of the present form.

9. LECANORA POLYTROPA, (*Ehrh.*) Thallus tartareous, glanulated, or diffracto-areolate, pale sulphur-coloured; hypothallus thin, black, often wanting. Apothecia small, numerous, innato-sessile; disc when young, plane, afterwards tumid, yellowish flesh-coloured; margin thin, pale, soon obliterated; asci narrow clavate, 8 spored; spores oblong, or elliptical-oblong, unilocular, subhyaline, or hyaline; ·0025 to ·003 in. long, by ·001 in. broad.

Lichen polytropus, Ehrh —Sm. E. Bot. 1264, two lower fig. in pt.—*Lecidea polytropa,* Ach. Meth.—Hook. Brit. Fl. 2. 185. in pt.—*Parmelia varia,* var. *polytropa,* Fries L. Ref. 158.—*Lecanora polytropa,* var. *campestris,* Schær. Enum. 81, L. H. 321 !—Massal. Ric. 12.—Hepp. Eur. 384 !—*Biatora polytropa,* var. Leight. Exs. 153 !—Kbr. S. L. G. 205.—*L. varia,* var. *polytropa,* Nyl. Enum. Gen. 114.

On rocks and stones in alpine districts. Eglestone ! Durham, *Rev. J. Harriman.* Old walls, Ingleby Park ! and Ayton Moor ! Cleveland, Yorkshire. Its spermogones are commonly present. They are exceedingly minute, and quite invisible without the aid of a good lens; they are punctiform, immersed, dark-brown or nearly black, indiscriminately scattered over the face of the thallus. The spermatia are abundant, cylindrical, elegantly curved or flexuose; ·0045 to ·005 in. long, by ·00012 in. broad.

β. ACRUSTACEA, (*Schær.*) Thallus effuse, very thin, granulose, pale sulphur-coloured; often wanting. Apothecia small, numerous, scattered, sessile; disc plane, greenish-yellow, surrounded by a thin, crenulated or entire, pale margin; spores as above.

Lecanora polytropa, a. *campestris,* b. *acrustacea,* Schær. Enum. 81.—Hepp. Eur. 67 !—*Biatora polytropa,* Leight. Exs. 179 !—*Lichen polytropus,* Sm. E. Bot. 1264, in pt.—*Patellaria polytropa,* Hoff.—*Lecanora varia, var.* Tayl. Fl. Hib. pt. 2. 137.

On rocks and stones, in alpine and subalpine districts; frequent.

γ. ALPIGENA, (*Ach.*) Thallus rather thick, rimoso-areolate, smooth, greenish-yellow; hypothallus thin, black. Apothecia small, subinnate, or sessile; disc plane, or slightly tumid, livid, or livid-black; margin thin, pale. Otherwise as above.

Lecanora varia, c. *alpigena*, Ach. L. Univ. 379, et *L. livida*, 375.—*Lecanora polytropa*, var. *alpigena*, Schær. Enum. 81, L. H. 322!—Massal. Ric. 13.—*Biatora polytropa*, var. *livida*, Kbr. S. L. G. 205.

On rocks, and occasionally on mosses, in alpine districts. Ben Nevis! *Admiral Jones.* Baysdale Moor! Cleveland. This form is chiefly distinguished by the livid, or bluish-black colour of its apothecia. Its spermogones are very numerous. They are scattered over the whole surface of the thallus, and are presented to the eye as extremely minute black points. The sterigmata and spermatia resemble those of the normal form.

δ. CONGLOBATA, (*Flotow.*) Thallus effuse, thin, granulated, greenish-yellow. Apothecia small, numerous, convex, at length conglobate, brownish, or greenish-yellow; immarginate; spores as in the normal form.

Biatora polytropa, var. *conglobata*, Fw. Kbr. S. L. G. 205.—*Lecanora polytropa*, β. *alpigena*, b. *acrustacea*, Schær. Enum. 81, L. H. 323!—Massal. Ric. 13.—*Biatora polytropa*, *var.* Leight. Exs. 152!

On rocks and old walls, in alpine and subalpine districts; frequent.

ε. INTRICATA, (*Schrad.*) Thallus thinnish, rimuloso-areolate in the centre, somewhat lobed or effigurate at the circumference; hypothallus black. Apothecia small, subinnate; disc plano-convex, yellowish flesh-coloured, changing to olive, livid, and nearly black; spores as in the normal form.

Lichen intricatus, Schrad.—*Lichen polytropus*, Sm. E. Bot. 1264, two upper figs.—*Lecidea intricata*, Borr. in Hook. Brit. Fl. 2. 185.—*Lecanora intricata*, Tayl. Fl. Hib. pt. 2. 137.—*L. polytropa*, var. *intricata*, Schær. Enum. 82, L. H. 572!—*Biatora polytropa*, var. *intricata*, Kbr. S. L. G. 205.

On rocks and stones, in alpine districts; frequent. The spermogones of the present form are similar to those of *alpigena*. The thallus of the whole of the varieties here enumerated is occasionally infested with a very minute parasite, which outwardly resembles their spermogones. It is described in the latter part of this work as a *Thelidium*.

10. LECANORA SULPHUREA, (*Hoffm.*) Thallus thickish, tartareous, rimoso-areolate; areolæ tumid, smooth, dull greenish sulphur-coloured; hypothallus indistinct. Apothecia of a medium size, at first innate, afterwards protruded, crowded and somewhat difformed; disc plano-convex, livid, or livid-black, subpruinose; margin thin, irregular, obscure; asci oblongo-clavate, 8 spored; spores elliptical-oblong, unilocular, hyaline; ·003 in. long, by ·001 in. broad.

Lichen sulphureus, Hoffm.—Sm. E. Bot. 1186.—, *Lecidea sulphurea*, Ach. Syn. 37.— Hook. Brit. Fl. 2. 181.—*Parmelia sordida*, β. *sulphurea*, Fries L, Ref. 179.—*Lecanora polytropa*, var. *sulphurea*, Schær. Enum. 82, L. H. 324!—*Parmelia sulphurea*, Leight. Exs. 114!—*Lecanora sulphurea*, Massal. Ric. 13. fig. 20.—Hepp. Eur. 189!—Nyl. Enum. Gen. 114.—*Zeora sulphurea*, Kbr. S. L. G. 136.

On rocks and stones, in alpine districts; frequent. The spermogones, of this species are not of uncommon occurrence, but on account of their minuteness they are not easily detected, unless specially looked for. They are quite invisible without the aid of a good lens, punctiform, immersed in very minute papillar elevations of the thallus, livid-black, solitary, very numerous, and often much crowded, indiscriminately scattered over the face of the whole thallus. The spermatia are abundant, of the same size and form as those of *polytropa.*

11. LECANORA GLAUCOMA, (*Ach.*) Thallus tartareous, at first contiguous, afterwards rimoso-areolate, glaucous-white; hypothallus thin, white. Apothecia of a medium size, numerous, often crowded and angular-difformed, innate; disc plane, or tumid, pale lead-coloured, or livid, cæsio-pruinose; margin thin, white, entire when young, flexuose and often nearly obliterated when old; asci oblongo-clavate, 8 spored; spores elliptical-oblong, unilocular, hyaline; ·003 in. long, by ·00125 in. broad.

Lichen glaucoma, Ach. Prod.—Sm. E. Bot, 2156.—*Lecanora glaucoma,* Ach. Syn. 165.—Hook. Brit. Fl. 2. 189.—Nyl. Enum. Gen. 114. —*Parmelia sordida,* Fries L. Ref. 178 in pt.—*Lecanora rimosa,* Schær. Enum. 71. L. H. 304!—Massal. Ric. 2. fig. 4.—*Parmelia glaucoma,* Leight. Exs. 53!—*Zeora sordida,* a. *glaucoma,* Kbr. S. L. G. 134 in pt.

β. SUBCARNEA, (*Ach.*) Thallus subdeterminate, rimoso-areolate, white. Apothecia innato-sessile; disc at first plane, afterwards tumid, pale flesh-coloured, pruinose; margin thin, elevated, white, somewhat crenulated. Spores as above.

Lecidea subcarnea, Ach. Syn. 45.—Hook. Brit. Fl. 2. 184.—*Parmelia sordida,* b. Fries L. Ref. 179.—*Lecanora rimosa,* var. *subcarnea,* Schær. Enum. 72.—Massal. Ric. 3.—Hepp. Eur. 60!—*Zeora sordida,* γ. *subcarnea,* Kbr. S. L. G. 134.

On whinstone, or other hard rocks, in mountainous districts; common. Its spermogones are of frequent occurrence, but usually most abundant on specimens nearly, or quite destitute of apothecia. They are indiscriminately scattered over the whole face of the thallus, punctiform, black, immersed in minute, papillar, thallodal elevations, the apices of which become fissured and thrown back, constituting a white rim round the ostiole. The sterigmata and spermatia, are similar in size and form to those of *subfusca.*

12. LECANORA FUSCOLUTEOLINA, *Mudd.* Thallus effuse, thin, granulose; granules minute, scattered and separate, or crowded and contiguous, forming an uneven greyish-white crust. Apothecia minute, numerous, sessile; disc plane, slightly rugulose, brownish orange-coloured, or yellowish-brown, surrounded by a greyish-green thallodal margin, which by age becomes tinged with the colour of the disc; asci obovato-clavate, 8 spored; spores linear-oblong, straight or slightly curved, unilocular, hyaline; ·005 to ·006 in. long, by ·001 in. broad.

On moss, etc., in alpine districts. On *Andreæa alpina,* Ben Lawers! *Admiral Jones.* The present species resembles, in its external aspect, *Lopadium fuscoluteum, Placodium lividum,* and *P. fuscoluteum,* Hepp. Eur. 401! and 404! But its spores shew that it is really a distinct species, and if their form and size be attended to, no difficulty need be feared as to being able to recognise it.

13. LECANORA COARCTATA, (*Ach.*) Thallus tartareous, verruculose, areolato-squamulose, or leprose, from pale-green becoming greyish-white, or glaucous; hypothallus white, evanescent. Apothecia small, scattered, or crowded, innate, at length sessile; disc plane, or tumid, soft, reddish-brown, becoming nearly black; margin white, pulverulent, coarctate, at length evanescent; asci elongato-clavate, 8 spored; spores elliptical-oblong, or ovate, filled with a pale rose-coloured finely granular protoplasm when young, afterwards subhyaline; ·0035 to ·00425 in. long, by ·00175 in. broad.

Parmelia coarctata, Ach. Meth. 362.—Fries L. Ref. 104.

α. ORNATA, (*Sommf.*) Thallus verruculose, or areolato-squamulose, greyish-white, or glaucous. Otherwise as above.

Parmelia coarctata, a. *ornata*, and b. *microphyllina*, Fries L. Ref. 105.—*Lecanora*. Schær. Enum. 77.—*Lecidea Salwesii*, Borr. in E. Bot. Suppl. 2861 (fide Schær.)—*Lecanora elacista*, Massal. Ric. 11.—*Zeora coarctata*, α. Kbr. S. L. G. 132.

β. GLEBULOSA, (*Sm.*) Thallus verrucoso-glebulose, or subsquamulose, glaucous-white, or pale brown; verrucæ tumid, at first scattered and separate, afterwards more or less crowded. Apothecia minute; disc plane, reddish-brown; margin thin, soon evanescent. Otherwise as above.

Lichen glebulosus, Sm. E. Bot. 1955.—*Psora glebulosa*, Hook. Brit. Fl. 2. 193.—*Biatora glebulosa*, Leight. Exs. 149!

γ. INVOLUTA, (*Tayl.*) Thallus tartareous, verrucose, greyish-white; verrucæ more or less scattered, flat, or slightly convex, somewhat lobed, or crenate. Apothecia reddish-brown, or pale rose-coloured. Otherwise as above.

Lecanora involuta, Tayl. Fl. Hib. pt. 2. 134.

δ. ELACISTA, (*Ach.*) Thallus very thin, effuse, leprose, from pale-green becoming greyish-white or glaucous Apothecia minute, numerous, at first innate, afterwards sessile; disc slightly concave when young and surrounded by a conspicuous, coarctate, white, thallodal margin; at length plane, the margin disappearing. Otherwise as in the normal form.

Parmelia elacista, Ach. Meth. 159.—*Lichen coarctatus*, Sm. E. Bot. 534.—*Parmelia coarctata*, c. Fries L. Ref. 105.—Leight. Exs. 177!—*Lecanora coarctata*, Hook. Brit. Fl. 2. 187.—Massal. Ric. 9.—*L. coarctata*, γ. *elacista*, Schær. Enum. 76, L. H. 312!—*Zeora coarctata*, β. *contigua*, Kbr. S. L. G. 133.—*Lecidea coarctata*, Nyl. Enum. Gen. 122, L. P. 54!

On rocks, turfy heaths, old mud-walls, etc.; α. and δ. common in subalpine and alpine districts. β. Carlton Bank! and near Ayton! Cleveland, Yorkshire. γ. On siliceous rocks, Carig and Dunkerron! County of Kerry, *Dr. Taylor*. The form and colour of both the apothecia, asci, and spores of the above, bear a general resemblance to each other, and shew clearly that they are only different states of one species. The spermogones are not often present; they are also not easily detected, unless specially looked for. They are verrucæform, very minute, reddish or dark-brown, somewhat prominent when moist, isolated and rather distantly scattered, or congregated together. The nucleus is of a delicate rose-colour when seen in a mass, becoming greyish-white or cream-coloured when dissected into minute particles. The spermatia are exceedingly numerous, acicular, or cylindrical, straight, very fine and delicate; ·00125 in. long, by ·0001 in. broad.

14. LECANORA ALBO-FLAVIDA, *Tayl.* Thallus tartareous, effuse,

rugoso-granulose, scattered, or contiguous, uneven; pale yellow, at length ochraceo-pulverulent. "Apothecia rarely present, sessile; disc concave, at length flat, brown flesh-coloured; margin swollen, smooth, inflexed, granulato-crenate." Spores. . . . . ?

Lecanora albo-flavida, Tayl. Fl. Hib. pt. 2. 260.

"On transition rocks, facing the south, Dunkerron, *Dr. Taylor*." Barmouth! *Rev. T. Salwey*. The present species is apparently a distinct one, but as I have not hitherto seen its apothecia, I feel uncertain as to whether this is its proper place. At first sight it resembles some of the varieties of *L. varia*, especially *orosthea* and *symmicta*, but when closely examined, its thallus is found to consist of distinct squamules, which through approximation, eventually form a rugoso-granulated crust, and the yellow pulverulent appearance arises from the abundance of sorediiferous excrescences which occur on their surface.

15. LECANORA PALLESCENS, (*L.*) Thallus membranaceo-subcartilaginous, at length tuberculoso-rugose, grey, or glaucous-grey; hypothallus thin, pale, greenish-white. Apothecia large, numerous, sessile; disc slightly concave, becoming plane, rugulose, pale flesh-coloured, white-pruinose, surrounded by a thick, elevated, thallodal margin; asci saccato-clavate, 8 spored; spores elliptical-oblong, or ovate, unilocular, filled with a granular or grumous protoplasm, greenish-yellow, or subhyaline; ·012 to ·014 in. long, by ·005 to ·007 in. broad.

Lichen pallescens, L.—*Parmelia pallescens*, Fries L. Ref. 132.

α. PARELLA, (*L.*) Thallus amylaceo-tartareous, rimose, areolato-verrucose, dirty white; the circumference thin, white. Apothecia large, very numerous, crowded, sessile; disc plane, at length somewhat rugose, pale, white-pruinose, surrounded by a thick elevated thallodal margin. Spores as above.

Lichen Parrellus, L.—Sm. E. Bot. 727.—*Lecanora Parella*, Ach. Syn. 169.—Hook. Brit. Fl. 2. 191.—Tayl. Fl. Hib. pt. 2. 137.—Nyl. Enum. Gen. 113, L. P. 38!—*Parmelia pallescens*, β. *parella*, Fries L. Ref. 133.—Leight. Exs. 8!—*Lecanora pallescens*, α. Schær. Enum. 78, L. H. 570!—*Ochrolechia parella*, Massal. Ric. 32. fig. 52.—*O. pallescens*, γ. Kbr. S. L. G. 149.

On exposed rocks and stones in mountainous districts; common.

β. TUMIDULA, (*Pers.*) Thallus rimuloso-verrucose, surrounded by a somewhat zonate margin. Otherwise as above.

Lichen tumidulus, Pers.—*Lecanora pallescens*, γ. *tumidula*, Schær. Enum. 79, L. H. 317!—Hepp. Eur. 188!—*Ochrolechia tartarea*, δ. *tumidula*, Massal. Ric, 31. fig. 50.—*Ochrolechia pallescens*, α. *tumidula*, Kbr. S. L. G. 149.

On the trunks of ash and other trees; frequent.

γ. TURNERI, (*Sm.*) Thallus effuse, rimuloso-verrucose, becoming greenish-white. Apothecia large, sparingly produced, scattered, sessile; disc slightly concave, flesh-coloured, white-pruinose; margin thick, entire, at length white-pulverulent. Spores as in the preceding.

Lichen Turneri, Sm. E. Bot. 857.—*Lecanora Turneri*, Ach. Syn. 170.—Hook. Brit. Fl. 2. 191.—Leight. Exs. 237!—*Lecanora pallescens*, δ. *alboflavescens*, Schær. Enum. 79, L. H. 318!—*Ochrolechia tartarea*, γ. *alboflavescens*, Massal. Ric. 31.—*O. pallescens*, β. *Turneri*, Kbr. S. L. G. 149.

On the trunks of trees; but not very common. Near Yarmouth! *D. Turner, Esq.* Ash trees near Ayton! and Ingleby! Cleveland, Yorkshire. The spores shew very clearly that this form is only a variety of the preceding one.

16. LECANORA TARTAREA, *(L.)* Thallus tartareous, granulated, or verruculoso-conglomerated, greyish-white. Apothecia large, scattered, subsessile; disc from concave becoming plane, rugulose, yellowish-brown, or pale flesh-coloured; margin thick, inflexed, eventually undulated; asci saccato-clavate, 8 spored; spores elliptical-oblong, or ovate, unilocular, filled with a granular or grumous protoplasm, greenish-yellow or subhyaline; ·009 to ·012 in. long, by ·005 in. broad. PLATE 2. *fig.* 51.

Lichen tartareus, L.—Sm. E. Bot. 156.—*Lecanora tartarea,* Ach. Syn. 172.—Hook. Brit. Fl. 2. 191.—Tayl. Fl. Hib. pt. 2. 138.—*Parmelia tartarea,* Fries L. Ref. 133.—Leight. Exs. 82!—*L. tartarea, α. saxorum,* Schær. Enum. 71, L. H. 541!—*Ochrolechia, tartarea, β.* Massal. Ric. 30. fig. 49.—*O. tartarea,* Kbr. S. L. G. 150.—*L. tartarea,* Nyl. Enum. Gen. 113.

β. ARBOREA, *(D.C.)* Thallus effuse, thinnish, granuloso-verrucose, and often sorediiferous, greyish-white. Apothecia large, scattered; disc plane, undulated, yellowish-brown, surrounded by a rather thin undulated margin. Spores as above.

Patellaria tartarea, γ. arborea, D.C.—*Lecanora tartarea, β. arborea,* Schær. Enum. 80.—*Ochrolechia tartarea,* b. Kbr. S. L. G. 150.

γ. FRIGIDA, *(L.)* Thallus thin, membranaceous, verruculose, somewhat shining, glaucous-white. Apothecia small, scattered; disc concave or plane, flesh-coloured, surrounded by a thin, entire, or crenulated margin. Spores as above.

Lichen frigidus, L.—Sm. E. Bot. 1879, and *Lichen Upsaliensis,* E. Bot. 1634—*Lecanora tartarea, γ. frigida,* Ach. Syn. 172.—*Parmelia tartarea, β. frigida,* Fries L. Ref. 134.—*L. tartarea, β. Upsaliensis,* Hook. Brit. Fl. 2. 191.—*L. pallescens,* var. *Upsaliensis,* Schær. Enum. 79, L. H. 316! and *L. tartarea,* var. *frigida,* Schær. Enum. 80.—*Ochrolechia Upsaliensis,* Massal. Ric. 31. fig. 51.

On rocks and stones. *α.* Common in alpine districts. *β.* On the trunks of trees, frequent. *γ.* On mosses, stems of heath, etc., in exposed situations. Teesdale! *Rev. J. Harriman.* Ben Lawers! Ben Macdhui! and Morchone! *Dr. Lindsay.* Ayton Moor! Cleveland, Yorkshire. The spermogones are ordinarily present. They are distinctly visible to the naked eye, verrucæform, of the same colour as the thallus, except the nucleus, which is pale flesh-coloured, prominent, isolated and evenly scattered, or congregated together into dense masses of various size, causing the surface of the thallus to have a verrucoso-conglomerated appearance. The sterigmata are apparently at times sterile and mixed with elongated hyaline filaments. The spermatia, when present, are exceedingly numerous, short, cylindrical or subellipsoid, ·00075 in. long, by ·00012 in. broad.

17. LECANORA OCULATA, *(Dicks.)* Thallus effuse, thinnish, cartilagineo-tartareous, smooth and somewhat shining, more or less papillose, glaucous, or cream-coloured. Apothecia of a medium size, scattered, sessile; disc from concave becoming plane, pale brown, or

glaucous; margin rather thick, inflexed, entire; asci saccato-clavate, 6-8 spored; spores large, oblong, or elliptical, unilocular, filled with a grumous protoplasm, subhyaline; ·009 to ·012 in. long, by ·007 to ·008 in. broad.

Lichen oculatus, Dicks.—Sm. E. Bot. 1833.—*Parmelia oculata,* Fries L. Ref. 135 in pt.—*Isidium oculatum,* Ach. Meth.—Hook. Brit. Fl. 2. 232.—*Lecanora oculata,* Nyl. Enum. Gen. 113.

On heaths, encrusting mosses, etc., in alpine districts. Scotland! in herb. *Harriman.* Cairn Gorm! *Admiral Jones.* Highlands! *Mr. R. Brown.* This species closely resembles *Pertusaria macrospora,* in its habit, and external appearance. The different number of spores in each ascus and their size and form, if due attention be paid to them, will prevent their confusion.

Genus 10. Hæmatomma, (*Massal.*)

Apothecia innate, at first closed, punctiform, afterwards scutelliform, margined by a thallodal exciple; thalamium arising from a carnose, simple hypothecium, which is seated on the gonimous stratum; asci clavato-ventricose 8 spored; spores acicular, curved or flexuose, 4-6-8 locular, subhyaline or hyaline. Thallus crustaceous, uniform; hypothallus white.

1. Hæmatomma ventosum, (*L.*) Thallus thick, tartareous, verrucoso-areolate, smooth, greenish sulphur-coloured; hypothallus white. Apothecia of a medium size, numerous, appressed, difformed; disc somewhat convex, naked, crimson or blood-red; margin thin, entire, often obliterated; asci clavato-ventricose, 8 spored; spores acicular, or clavato-fusiform, variously curved, or flexuose, from quadrilocular, becoming 6-8 locular, subhyaline, or hyaline; ·0075 to ·011 in. long, by ·00075 to ·001 in. broad. Plate 2. *fig.* 52.

Lichen ventosus, L.—Sm. E. Bot. 906.—*Lecanora ventosa,* Ach. Syn. 159.—Hook. Brit. Fl. 2. 189.—Tayl. Fl. Hib. pt. 2. 136.—Schær. Enum. 84, L. H. 320!—Nyl. Enum. Gen. 115.—*Parmelia ventosa,* Fries L. Ref. 153.—Leight. Exs. 9!—*Hæmatomma ventosum,* Massal. Ric. 33. fig. 54.—Kbr. S. L. G. 152.

On rocks and walls in mountainous districts; common. Its spermogones are of frequent occurrence; they are of a livid-black colour, very conspicuous, prominent, verrucæform, confluent, or solitary, irregularly scattered over the surface of the thallus. The spermatia are cylindrical, or subacicular, straight, ·00125 in. long, by ·00012 in. broad. The thallus of this species is liable to be infested with a minute parasite, which, outwardly, somewhat resembles the spermogones. It is hereafter described as a *Microthelia.*

2. Hæmatomma coccineum, (*Dicks*) Thallus effuse, tartareo-farinose, white, or pale sulphur-coloured; hypothallus fibrillose, white, Apothecia of a medium size, or small, numerous, innate, at length emersed, irregular; disc plane, or somewhat convex, scarlet, surrounded by a thick, subcrenated, thallodal margin; asci clavato-subventricose, 8 spored; spores acicular, or linear-fusiform, 4-6-8 locular, curved, or flexuose, subhyaline or hyaline; ·009 to ·013 in. long, by ·00075 in. broad.

Lichen coccineus, Dicks.—Sm. E. Bot. 223—*Lichen Hæmatomma,* Ehrh.—Sm. E. Bot. 486.—*Lecanora Hæmatomma,* Ach. Syn. 170.—Hook. Brit. Fl. 2. 190.—Schær. Enum. 84, L. H. 543!—Nyl. Enum. Gen. 115, L. P. 45!—*Parmelia Hæmatomma,* Fries L. Ref. 154.—Leight. Exs. 214!—*Hæmatomma vulgare,* Massal. Ric. 32. fig. 53.—*H coccineum,* Kbr. S. L. G. 153.

On rocks and stones, and occasionally on the trunks of trees; common in mountainous districts. Its spermogones are not very commonly produced, they are also rather difficult to detect on account of their resemblance to young apothecia. They are exceedingly minute, papillæform, slightly prominent, solitary, or rarely confluent, scarlet or dark-red, indiscriminately scattered over the whole surface of the thallus, or only toward its circumference. The spermatia are very abundant, cylindrical, elegantly curved or flexuose, ·0045 to ·005 in. long, by ·00012 in. broad.

SUBTRIBE 4. URCEOLARINEÆ.

Thallus squammuloso-crustaceous, or crustaceous; hypothallus mostly black, often wanting. Apothecia more or less urceolate, margined by a compound exciple.

GENUS II. ACAROSPORA, (*Massal.*)

Apothecia suburceolate, at first immersed, afterwards more or less emersed, nearly plane, margined by a compound exciple; thalamium arising from a subcarnose or grumous simple hypothecium, which is seated on the gonimous stratum; asci subclavate, or saccate, polyspored; spores very minute, oblong, unilocular, hyaline. Thallus squamuloso-crustaceous, or crustaceous, effigurate or effuse; hypothallus black, more or less evanescent.

1. ACAROSPORA CERVINA, (*Pers.*) Thallus carlilagineo-tartareous, squamulose, areolate, smooth, greenish-brown, or chestnut-coloured; squamules appressed, angular and somewhat lobed. Apothecia small, at first immersed, urceolate, afterwards emersed so as to be nearly on a level with the surface of the thallus, plane; disc dark-brown or nearly black, surrounded by a narrow undulated thallodal margin; asci subclavate, or clavate, 50 to 100 spored; spores oblong, unilocular, hyaline; ·00075 in. long, by ·00025 in. broad. PLATE 3. *fig.* 53.

Lichen cervinus, Pers. in Ach. Meth. 181.—*Parmelia cervina,* Fries L. Ref. 127.

α. SQUAMULOSA, (*Schrad.*) Thallus and apothecia as above.

Lichen squamulosus, Schrad.—Sm. E. Bot. 2011.—*Parmelia cervina,* b. *squamulosa,* Fries L. Ref. 127.—*Lecanora squamulosa,* Hook. Brit. Fl. 2 187.—*Lecanora cervina,* var. *castanea,* Schær. Enum. 55.—Nyl. Enum. Gen. 112.—*Acarospora cervina.* Massal. Ric. 28.—Kbr. S. L. G. 154.

On rocks in alpine or mountainous districts; frequent. The spermogones of the present form are not of unfrequent occurrence. They are minute, numerously scattered over the surface of the squamules, papillæform, prominent, solitary, concolorous with the thallus, or a little darker. The spermatia are excessively minute, atomic and for the most part unmeasureable.

β. PERCÆNA, (*Ach.*) Thallus squamulose, chestnut-coloured; squamules distinct and separate, afterwards approximate and somewhat imbricated, slightly pruinose; margins subcrenulated or flexuose, white. Apothecia and spores as above.

Lecidea percæna, Ach. Syn. 29.—*Parmelia cervina, β. percæna*, Fries L. Ref. 128.—*Lecanora cervina, γ. percæna*, Schær. Enum. 56, L. H. 613! in. pt.—*Myriospora glaucocarpa, β. percæna*, Hepp. Eur. 378!

On calcareous rocks in alpine districts; not common. Lancashire! *Mr. R. Jacob.* This form is apparently confined to limestone rocks, and is distinguished from the preceding, chiefly by the white margins of its squamules.

γ. RUFESCENS, (*Borr.*) Thallus cartilagineo-tartareous, squamulose, or areolato-glebulose, smooth, reddish-brown, or dark-brown. Apothecia small, one or two immersed in each areolæ, at first urceolate, afterwards nearly plane; disc dark-brown, surrounded by an irregular thallodal margin. Otherwise as above.

Lecidea rufescens, Borr. in E. Bot. Suppl. 2657.—*Urceolaria rufescens*, Hook. Brit. Fl. 2. 173.—Tayl. Fl. Hib. pt. 2. 132.—*Lecanora cervina, δ. rufescens*, Schær. Enum. 56.—*Myriospora rufescens*, Hepp. Eur. 56!

On rocks, walls, &c., Cappamore! near Dunkerron, *Dr. Taylor.* On old walls near Ayton! Cleveland, Yorkshire. Thallus spreading in a somewhat circular manner, forming patches from a few inches to a foot in diameter; squamules crowded, smooth, angular, variable in size, of a dark reddish-brown colour.

δ. SMARAGDULA, (*Ach.*) Thallus cartilagineo-tartareous, glebuloso-squamulose, smooth, greenish-yellow, or greenish-brown; squamules small, rounded, distinct and separate, or approximate. Apothecia minute, one, two, or more immersed in each squamule, depressed; disc dark-brown; otherwise as above.

Lichen smaragdulus, Sm. E. Bot. 1512.—*Endocarpon smaragdulum*, Ach. Syn. 98.—Hook. Brit. Fl. 2. 158.—Leight. Brit. Angi. Lich. 16. p. 4. fig. 3.—*Parmelia cervina, c. discreta*, Fries L. Ref. 127.—*Endocarpon rufovirescens*, Tayl. Fl. Hib. pt. 2. 100.—*Lecanora cervina, c. smaragdula*, Schær. Enum. 55, L. H. 117!—*Acarospora smaragdula*, Massal. Ric. 29.—*Myriospora smaragdula*, Hepp. Eur. 175!—*A. sinopica, β. smaragdula*, Kbr. S. L. G. 156.

On rocks and stones in mountainous districts; frequent. *Endocarpon rufovirescens*, Tayl., appears to me to be inseparable from the present form, which is distinguished chiefly by its scattered mode of growth, and by the colour of its thallus.

ε. MICROSTICTA, (*Leight.*) Thallus subcartilaginous, areolato-squamulose, dull reddish-brown; squamules variable in size, mostly tumid and difformed, forming an uneven areolate crust. Apothecia very minute, immersed in the squamules; disc eventually plane, dark-red, or of the same colour as the thallus; spores very minute, ellipsoid, hyaline; ·00025 to ·0005 in. in diameter.

Endocarpon microsticticum, Leight. Exs. 317!

On moist rocks. Barmouth! North Wales, *Rev. W. A. Leighton.* The form and structure of both the apothecia, asci, and spores, shew that this plant is only a state of the preceding form.

ζ. SINOPICA, (*Wahlb.*) Thallus cartilagineo-tartareous, areolato-squamulose, appressed, smooth, roundly lobed at the circumference, rusty-red coloured. Apothecia very minute, punctiform, dark-brown, or nearly black. Otherwise as in *smaragdula.*

Endocarpon sinopicum, Wahlb. in Ach. Meth. Supple. 30.—Hook. Brit. Fl. 2. 159.—*Lichen sinopicus,* Sm. E. Bot. 1776.—*Lecanora cervina,* d. *sinopicum,* Schær. Enum. 55, L. H. 116 !—*Endocarpon smaragdulum,* β. Leight. Brit. Angi. Lich. 16. pl. 5. fig. 1., Exs. 255 !—*Acarospora smaragdula,* var. *sinopica,* Massal. Ric. 29. fig. 47.—*Acarospora sinopica,* Kbr. S. L. G. 156.

On rocks in alpine districts. Aber ! Caernarvonshire, *Rev. W. A. Leighton.* Aberfeldy ! and Ben Lawers ! *H. Macmillan, Esq.*

η. PRIVIGNA, (*Ach.*) Thallus glebuloso-squamulose; squamules distinct, or approximate, very minute, smooth, grey or olive-brown when moist, dark-brown when dry. Apothecia minute, one immersed in the centre of each squamule, concave, olive-brown, or nearly black. Otherwise as in *smaragdula.*

Lecidea privigna, Ach.—Hook. Brit. Fl. 2. 184.—*Lichen simplex,* Sm. E. Bot. 2152 (two right hand figures).—*Endocarpon smaragdulum,* var. *privigna,* Leight. Brit. Angi. Lich. 16, Exs. 196 !

On rocks and walls in mountainous districts. Lynmouth ! North Devonshire, *Miss M. Atwood.* On mountain-limestone boulders, near Ayton ! Cleveland, Yorkshire.

φ. HEPPII, (*Naeg.*) Thallus effuse, thin, leprose, greyish-white. Apothecia very minute, immersed in scattered pale-brown, rounded, convex, minute squamules ; disc concave, brown ; margin smooth and even at first, afterwards angular and somewhat flexuose ; hypothecium thin, pale ; asci oblongo-clavate, 100 to 150 spored ; spores oblong, unilocular, hyaline ; ·001 in. long, by ·00025 in. broad.

Myriospora Heppii, Neag. Hepp. Eur. 57 !—*Gyalecta Acharii,* Schær. Enum. 93 in pt.

On moist rocks and stones. Boxley Hill ! Sussex, and in the New Forest ! *Admiral Jones.* This form may be readily recognised, by its thin leprous thallus, and pale brown scattered apothecia.

ι. SIMPLEX, (*Davi.*) Thallus glebuloso-squamulose, becoming leprose, and eventually evanescent. Apothecia minute, numerous, often crowded, and somewhat grouped, sessile, rounded, or anguloso-difformed ; disc naked, rugulose, plane or slightly concave, reddish-black; margin rather thick, elevated, flexuose, rugged, black ; hypothecium pale yellowish-brown, subgrumous ; asci 50 to 100 spored ; spores very minute, elliptical, unilocular, hyaline ; ·0005 to ·00075 in. long, by ·00025 to ·0005 in. broad.

Lichen simplex, Davies.—Sm. E. Bot. 2152. (two left hand fig.)—Leight. Exs. 272 ! and 273 !—*Lecidea simplex,* Hook. Brit. Fl. 2. 179. —*Biatorella immersa,* var. *atrosanguinea,* Massal. Ric. 132.—*Sarcogyne privigna,* var. *simplex,* Kbr. S. L. G. 266.—*Lecanora cervina,* var. *simplex,* Nyl. Enum. Gen. 112.

On slate rocks in mountainous districts. Authentic specimen from *Davies !* Barmouth ! North Wales, *Rev. W. A. Leighton.* Capstone Hill ! Ilfracombe, *Miss M. Atwood.* The transition state, between *L.*

simplex and *Endocarpon smaragdulum,* issued by the Rev. W. A. Leighton in his Lich. Exs. 273, clearly proves, that, however much *extreme forms* may appear to the contrary, *simplex* is not a distinct species, and that the present subtribe is its proper place in the present arrangement. Indeed the whole of the forms here enumerated and described, can only be regarded as varieties of one species, as transition states between the different forms are of frequent occurrence. The great similarity in the structure and form of their apothecia, asci, paraphyses, and spores, also proves the same.

GENUS 12. ASPICILIA, (*Massal.*)

Apothecia at first closed, innate in the thallus, or immersed in protuberant verrucæ, afterwards urceolate, rarely plane, margined by an internal carnose, or at times subcarbonaceous, proper exciple, and an external thallodal exciple; thalamium subgelatinous, arising from a simple carnose hypothecium; asci clavate, or ventricose, 4, 6, 8, spored; spores elliptical, ovate, or subrotund, unilocular, uncoloured. Thallus crustaceous; hypothallus black, or brown, often evanescent.

1. ASPICILIA EPULOTICA, (*Ach.*) Thallus tartareous, thin, rimulose, smooth, reddish-brown, ochraceous, or of a pale cream-colour. Apothecia minute, numerous, scattered, immersed in the thallus; disc urceolate, becoming nearly plane, pale rose-coloured; margin incorporated with the thallus when young, afterwards becoming somewhat separate and distinct, thin, entire, of the same colour as the thallus; asci clavate, 8 spored; spores elliptical-oblong, unilocular, subhyaline, or hyaline; ·003 in. long, by ·0015 in. broad. PLATE 3, *fig.* 54.

Gyalecta epulotica, Ach. L. Univ. 151.—*Lichen Acharii,* Sm. E. Bot. 1087.—*Urceoalria Acharii,* Hook. Brit. Fl. 2. 172.—*Parmelia cinerea,* var. *lacustris,* Fries L. Ref. 145.—*Biatora epulotica,* Hepp. Eur. 272!

β. PUNCTATA, (*Dicks.*) Thallus thin, somewhat determinate, smooth or slightly rugulose, rimoso-areolate, greyish-white, or pale-brown. Apothecia very minute, innate in the areolæ, solitary, or two or three congregated together in each areola; disc urceolate or depresso-punctiform, from pale-brown becoming dark-brown, thallodal margin incorporated with the thallus; hypothecium thin, pale, subgrumous; asci clavate, 8 spored; spores elliptical-oblong, unilocular, hyaline; ·002 to ·0025 in. long, by ·00075 in. broad.

Lichen punctutus, Dicks.—Sm. E. Bot. 450.—*Urceolarea Acharii,* β. *cyrtaspis,* Ach. Syn. 137.—Hook. Brit. Fl. 2. 172.

On rocks and stones, which are liable to be inundated or suffused with water. Near Edinburgh! Scotland; and Tollymore Park! Co. Down, Ireland, *Dr. Maingay.* Wet rocks at the Head of Long-na-Cat! *Admiral Jones.* Connor Cliff! Dingle, Ireland, *I. Carroll, Esq.*—β. On stones, Ireland; *Admiral Jones.* This variety differs from the ordinary state of *epulotica,* by its apothecia being smaller in size, and of a different colour, and by its smaller spores. In its external appearance it resembles states of *Acarospora cervina,* especially *smaragdula* and *privigna*; the difference in their spores, will always separate them, as well as prevent their confusion.

2. ASPICILIA CALCAREA, (*L.*) Thallus somewhat determinate, or

effuse, tartareo-farinose, rimuloso-areolate; areolæ angular, smooth, white, or greyish-white; the circumference often somewhat effigurate; hypothallus white. Apothecia small, numerous, immersed in the areolæ; disc from concave becoming plane, brown when young, cæsio-pruinose, afterwards black, surrounded by an entire, or rugoso-plicate, thallodal margin, which eventually becomes pulverulent; asci saccato-clavate, 4-6 spored; spores subglobose, often difformed through compression in the ascus, unilocular, subhyaline or hyaline; ·005 to ·007 in. long, by ·004 to ·0045 in. broad. PLATE 3, *fig.* 55.

Lichen calcareus, L.—*L. Hoffmanni*, Sm. E. Bot. 1940.—*Urceolaria calcarea*, Ach. Syn. 143.—Hook. Brit. Fl. 2. 172.—Schær. Enum. 91, L. H. 476!—*Parmelia calcarea*, Fries L. Ref. 187.—Leight. Exs. 13! *Pachyospora calcarea*, Massal. Ric. 42. fig. 74.—*Aspicilia contorta*, Kbr. S. L. G. 166 in pt.—*Lecanora cinerea*, var. *calcarea*, Nyl. Enum. Gen. 113, L. P. 126!

β. CONTORTA, (*Flk.*) Thallus effuse, areolate; areolæ elevated, distinct, and more or less scattered, creamy-white. Apothecia immersed in the centre of the areolæ. Otherwise as above.

Urceolaria contorta, Flk. D. F. n. 30.—*U. calcarea*, *β. contorta*, Schær. Enum. 91, L. H. 131!—*Pachyospora calcarea*, var. *contorta*, a. *cinereo-virens*, and b. *cinerea*, Massal. Ric. 43. fig. 75.

On calcareous rocks and stones; very common in limestone districts. The spermogones are usually present. They are distinctly visible to the eye as minute dots on the surface of the thallus, and resemble young apothecia, but if they are microscopically examined, they will be found to be essentially different; they are papillæform, semi-immersed, dark-brown, or black, numerously scattered over the areolæ. The spermatia are very abundant, cylindrical, straight, ·0015 in. long, by ·00016 in. broad.

3. ASPICILIA GIBBOSA, (*Ach.*) Thallus tartareous, areolato-verrucose, greyish-olive; verrucæ more or less crowded, convex, angular; hypothallus greyish-green, extended beyond the thallus, forming an undulato-radiated margin. Apothecia of a medium size, innate in the verrucæ, at length emersed so as to be above the level of the thallus; disc concave or nearly plane, dark-brown when moist, black when dry; thallodal margin slightly elevated, smooth, entire; hypothecium pale yellow; asci saccato-clavate, 6 or 8 spored; spores oblong or nearly round, often difformed, unilocular, subhyaline; ·005 in. in diameter, or ·004 to ·005 in. long, by ·0025 to ·004 in. broad.

Urceolarea gibbosa, Ach. Syn. 139.—Hook. Brit. Fl. 2. 172.—*Lichen fibrosus*, Sm. E. Bot. 1739, and *Lichen tuberculosus*, Sm. E. Bot. Suppl. 1733.—*Lecanora aspersa*, Borr. in E. Bot. Suppl. 2728.—Hook. Brit. Fl. 2. 188, and *L. tuberculosa*, Hook. Brit. Fl. 2. 188.

On loose flints. South Downs! Sussex, *Mr. Borrer*. Near Lewes! *W. Unwin, Esq.* The spores shew that *U. gibbosa*, *L. tuberculosa*, and *L. aspersa*, are only different states of one species. Their spermogones and spermatia are also identical; but as they differ but little from those of *calcarea*, a description of them is not necessary. The thallus of both the present species and of the preceding one, is liable to be infested with two parasites, one of which is hereafter described as a *Thelidium*, and the other as a *Microthelia*.

4. ASPICILIA CINEREA, (*L.*) Thallus tartareous, rimoso-areolate,

grey, or glaucous-grey; hypothallus black. Apothecia small, immersed, afterwards more or less emersed, solitary, or confluent; disc concave, becoming nearly plane, black, naked, or slightly grey-pruinose; margin thin, entire; asci ventricoso-clavate, 4, 6, or 8 spored; spores elliptical, or ovate, often difformed, unilocular, filled with a finely granular protoplasm, subhyaline; ·006 to ·007 in. long, by ·003 to ·004 in. broad.

Lichen cinereus, L.—Sm. E. Bot. 1751.—*Urceolaria cinerea,* Ach. Syn. 240.—Hook. Brit. Fl. 2. 172.—*Parmelia cinerea,* Fries L. Ref. 142.—Leight. Exs. 175! and 204!—*U. cinerea, a. b. c. d. e. f.*, Schær. Enum. 86, L. H. 125! and 126!—*Aspicilia polygonia*, and *A. scutellaris*, Massal. Ric. 36, 38. fig. 59, 61, and 65.—*Aspicilia cinerea.* Kbr. S. L. G. . 164.—*Lecanoria cineria,* Nyl. Enum. Gen. 113.—Hep. Eur. 388!

On rocks and stones in mountainous districts; frequent. The spermogones and spermatia, bear a general resemblance to those of *calcaria.*

β. OCELLATA, (*Flork.*) Thallus effuse, tartareous, areolato-verrucose, dark grey, or greyish-white. Apothecia immersed in the thallodal verrucæ, at length more or less emersed; disc concave, becoming nearly plane, black; thallodal margin thin, slightly elevated, white-pulverulent. Asci and spores as above.

Urceolaria ocellata, Florke, *Urceolaria calcarea, γ. cinerascens,* Schær. Enum. 91.—*Pachyospora ocellata*, and *P. cineresscens,* Massal. Ric. 44, 45, fig. 78 and 79.—*Lecanora ocellata,* Hepp. Eur. 389!

On rocks and stones in mountainous districts; frequent. This form is distinguished from the preceding one, chiefly, by the white-pulverulent thallodal margins of its apothecia.

γ. CINEREO-RUFESCENS, (*Ach.*) Thallus tartareous, rimoso-areolate, smooth, greyish-white, or ochraceus; hypothallus greyish-black. Apothecia small, innate; disc naked, from concave becoming nearly plane, reddish-brown, or reddish-black; margin mostly incorporated with the thallus. Asci and spores as above.

Urceolaria cinereo-rufescens, Ach. L. Univ. 677.—Scær. Enum. 88, L. H. 130!—*Parmelia cinerea,* var. *cinereo-rufa,* Fries L. Ref. 145.—*Aspicilia cinereo-rufescens*, Massal. Ric. 37. fig. 62.—Kbr. S. L. G. 162.—*L. cinerea,* var. *cinereorufescens*, Nyl. Enum. Gen. 113.

On rocks in alpine districts. Barmouth! *Rev. T. Salwey.*

δ. AQUATICA, (*Fries.*) Thallus spongioso-tartareous, rimoso-areolate, smooth, glaucous, or greenish-grey. Apothecia of a medium size, immersed; disc concave, becoming nearly plane, black. Otherwise as above.

Parmelia cinerea β. aquatica, Fries L. Ref. 144.—*Aspicilia aquatica,* Kbr. S. L. G. 165.—*Lecanora aquatica,* Hepp. Eur. 390!

On rocks and stones that are liable to be suffused or inundated with water. Aviemore! *Admiral Jones.*

5. ASPICILIA OCHRACEA, (*Schær.*) Thallus effuse, thin, rimoso-areolate, smooth, ochraceous, or glaucous-grey. Apothcia very minute, numerous, innate; disc from concave becoming nearly plane, bluish-black; thalamium bright blue when moist; margin thin, entire, often incorporated with the thallus; asci ovate, or oblongo-clavate, 8-spored; spores elliptical-oblong, unilocular, subhyaline, or hyaline; ·003 to ·0035 in. long, by ·00175 in broad.

Urceolaria cinerea, γ. ochracea, Schær. Enum. 87, L. H. 128 !—*Parmelia cinerea,* var. *ochracea,* Leight. Exs. 292 !

On rocks and stones in moist situations, in mountainous districts. Cockshaw Bank ! and Broughton Bank ! Cleveland, Yorkshire. This species may be readily recognised from all the states of the preceding one, by its ovate asci, and minute elliptical-oblong spores. The colour of its thalamium will also aid in its identification.

6. ASPICILIA ATHROCARPA, (*Ach.*) Thallus tartareous, thickish, determinate, rimoso-areolate, pale olive-brown, or cream-coloured ; areolæ crowded, smooth, shining, tumid and angular ; hypothallus brownish-black. Apothecia small, innate in the areolæ, afterwards slightly elevated so as to be on a level with the surface of the thallus, or a little above it; disc reddish-black, concave when dry, plane when moist ; thallodal margin thin, evanescent ; proper margin entire, smooth, slightly elevated ; hypothecium thin, dark reddish-brown ; asci clavato-ventricose, 8 spored ; spores enveloped in a gelatinous hyaline membrane, elliptical-oblong, or ovate, unilocular, filled with a finely granular protoplasm, subhyaline ; ·006 to ·008 in. long, by ·0035 to ·004 in. broad.

Lichen athrocarpus, Ach. Prod. 77.—Sm. E. Bot. 1829.—*Lecidea cechumena, β. athrocarpa,* Hook. Brit. Fl. 2. 175.

On rocks in alpine districts. Teesdale ! Durham, *Rev. J. Harriman.* Ben Lawers ! and Tollymore Park ! Ireland, *Dr. Maingay.* Connor Cliff ! and Summit of Brandon ! Co. Kerry, *I. Carroll, Esq.* Near Belfast ! *D. Moore, Esq.*

7. ASPICILIA PELOBOTRYA, (*Wahlb.*) Thallus effuse, tartareous, areolato-verrucose, pale brown, or cream-coloured. Apothecia of a medium size, scattered, immersed in the verrucæ ; disc concave becoming nearly plane, brownish-black, surrounded by a rather thick inflexed thallodal margin ; asci broadly clavate, 8 spored ; spores elliptical-oblong, unilocular, more or less filled with a finely granular protoplasm, subhyaline ; ·006 to ·007 in. long by ·003 to ·00375 in. broad.

Urceolaria pelobotrya, Wahlb. in Ach. Meth. Suppl. 31.—*Parmelia pelobotrya,* Fries L. Ref. 189.

On micaceous rocks in alpine districts. Head of Lough-na-Cat ! *Admiral Jones.* The spermogones are apparently of frequent occurrence. They are sparingly scattered over the face of the thallus, papillæform, prominent, solitary, pale brown or nearly concolorous with the thallus. The spermatia are very numerous, short, ellipsoid, ·00075 in. long, by ·0002 to ·00025 in. broad.

8. ASPICILIA VERRUCOSA, (*Ach.*) Thallus effuse, thin, cartilaginous, verrucose, smooth, or slightly pulverulent, white. Apothecia rather large, immersed in the thallodal verrucæ ; disc urceolate, naked, or slightly pruinose, black, rugulose ; thallodal margin white, thick, inflexed ; proper margin thin, entire, black, at first entirely concealed by the thallodal margin, afterwards more or less conspicuous ; asci very large, saccato-clavate, 6-8 spored ; spores elliptical, or elliptical-oblong, unilocular, filled with a finely granular protoplasm, subhyaline ; ·008 to ·01 in. long, by ·005 to ·007 in. broad. PLATE 3, *fig.* 56.

Urceolaria verrucosa, Ach. Lich. Univ. 339.—Schær. Enum. 92, L. H. 133 !—*Parmelia verrucosa,* Fries. L. Ref. 186 in. pt.—*Pachyospora* *verrucosa*, Massal. Ric. 44. fig. 76.—*Lecanora verrucosa*, Hepp. Eur. 193!—Nyl. Enum. Gen. 113.—*Aspicilia verrucosa*, Kbr. S. L. G. 167.

On heaths, encrusting mosses, &c., in alpine districts. Craig-na-Calliach! and Ben Lawers! *Dr. Maingay.* A very minute parasite occurs on the thallus of this species; but whether it ought to rank as a Lichen, or as a Fungi, I feel uncertain, from the limited number of specimens at my disposal for examination, consequently a description of it here must suffice for the present. It is as follows—Perithecia very minute, black, immersed in the alien thallus, slightly prominent, solitary, scattered; nucleus pale; paraphyses capillary, distinct; asci clavato-cylindrical, 8 spored; spores ovate-oblong, or subclavate, bilocular, hyaline; ·0035 in. long, by ·001 in. broad.

GENUS 13. URCEOLARIA, *(Ach.)*

Apothecia at first closed, immersed in the thallus, afterwards urceolate, margined by an internal subcupular carbonaceous proper exciple, and an external thallodal exciple; thalamium arising from a brown grumous simple hypothecium; asci subclavate or narrow-oblong, 4 spored; spores elliptical-oblong, or subpyriform, muriform-multilocular, varying in colour from green to dark-brown. Thallus crustaceous, uniform; hypothallus white.

1. URCEOLAREA SCRUPOSA, (*L.*) Thallus tartareo-farinose, areolate, rugoso-verrucose, or granulose, at length somewhat pulverulent, glaucous or greyish-white. Apothecia small, numerous, scattered, immersed; disc, urceolate, black, cinerio-pruinose; thallodal margin thick, crenated, at first more or less incorporated with the thallus, afterwards somewhat evanescent; proper margin connivent, greyish-black; asci subclavate or narrow-oblong, 4 spored; spores elliptical-oblong, or subpyriform, muriform-multilocular, varying in colour from green to dark-brown; ·005 to ·007 in. long, by ·002 to ·00275 in. broad. PLATE 3, *fig.* 57.

Lichen scruposus, L.—Sm. E. Bot. 266.—*Urceolaria scruposa*, Ach. Syn. 143.—Hook. Brit. Fl. 2. 172.—Tayl. Fl. Hib. pt. 2. 132.—Schær. Enum. 89, L. H. 289! 501! 132!—Massal. Ric. 33, fig. 55.—Kbr. S. L. G. 168.—Nyl. Enum. Gen. 116, L. P. 46!—*Parmelia scruposa*, Fries L. Ref. 190.

β. BRYOPHILA, (*Ach.*) Thallus effuse, granulato-rugose, greyish-white, or white. Apothecia mostly in the centre, urceolate; proper margin at length prominent; thallodal margin more or less evanescent, spores as above.

Urceolaria bryophila, Ach. L. Univ. 341.—*Parmelia scruposa*, *β.* Fries L. Ref. 191.—Leight. Exs. 54!—*Urceolaria scruposa*, var. *bryophila*, Schær. Enum. 90, L. H. 290!—Hepp. Eur. 210!—Massal. Ric. 34.

On rocks and walls in mountainous districts; common. *β.* On mosses, less frequent. Blaeberry Hill; Perth, *Dr. Lindsay.* Near Shrewsbury! *Rev. W. A. Leighton.* Langbraugh! Cleveland, Yorkshire.

GENUS 14. PHIALOPSIS, *(Kbr.)*

Apothecia at first closed, adnate, afterwards urceolate, margined by an internal subcupular carnose proper exciple, and an external thallodal exciple; thalamium arising from a pale carnose simple hypothecium, which is seated upon the gonimous stratum; asci oblongo-lanceolate, 8 spored; spores elliptical-oblong, quadrilocular, uncoloured. Thallus crustaceous, effuse; hypothallus white.

The distinguishing characters of the present genus, are its urceolate apothecia, double or compound exciple, and quadrilocular spores.

1. PHIALOPSIS RUBRA, (*Hoffm.*) Thallus effuse, at first subcartilaginous, becoming leproso-verruculose, white, or glaucous-white. Apothecia of a medium size, numerous, often very much crowded, adnate; disc concave, at first pale-red, afterwards bright or dark-red, surrounded by a conspicuous, inflexed, crenulated thallodal margin, which for the most part conceals the internal proper one; asci oblongo-lanceolate, 8 spored; spores elliptical-oblong, quadrilocular, subhyaline, or hyaline; ·003 to ·0035 in. long, by ·00125 to ·0015 in. broad. PLATE 3, *fig.* 58.

Patellaria rubra, Hoffm.—*Lichen. Ulmi*, Swartz.—Sm. E. Bot. 2218. *Lecanora rubra*, Ach. Syn. 177.—Hook. Brit. Fl. 2. 190.—Schær. Enum. 84, L. H. 319!—Nyl. Enum. Gen. 115.—*Parmelia rubra*, Fries L. Ref. 134.—Leight. Exs. 236!—*Gyalecta rubra*, Massal. Ric. 146. fig. 286.—*Patellaria rubra*, Hepp. Eur. 205!—*Phialopsis rubra*, Kbr. S. L. G. 170.

On the trunks of trees, and occasionally on old walls. On the walls of Wigmore Castle! Herefordshire; and Craig-y-rhu, Oswestry, *Rev. T. Salwey*. On elms on the banks of the Rye near, Rievaulx! Bilsdale, Yorkshire. The present species is one of the most elegant of the crustaceous Lichens, and one which is so well characterised, that it cannot easily be confounded with any other species.

2. PHIALOPSIS LIVIDA, *Mudd.* Thallus effuse, thinnish, subtartareous, granuloso-verruculose, becoming somewhat leprous, white. Apothecia small, not very numerous, scattered, sessile; disc livid or bluish-black, slightly concave when young, subsequently plane, surrounded by a thickish, smooth, and somewhat polished, white thallodal margin; hypothecium dark-red, grumous; paraphyses lax, stout, their apices bluish-black; asci rarely produced, clavate, 8 spored; spores elliptical-oblong, irregularly quadrilocular, filled with a grumous protoplasm, subhyaline; ·003 in. long, by ·00125 in. broad.

On the trunks of old trees, encrusting mosses, etc. Killarney! Ireland, *D. Moore, Esq.* This species somewhat resembles *Aspicilia verrucosa*, in its mode of expansion and outward appearance. It may be known by the colour of its hypothecium, stout paraphyses, and by the internal organization of its spores. The examination of these last organs was not so satisfactory as I could have wished, on account of the rareness of their presence.

GENUS 15. GYALECTA, (*Ach.*)

Apothecia at first closed, tuberculiform, afterwards urceolate, margined by an internal thick carnose proper exciple, and an external thallodal exciple; thalamium arising from a carnose simple hypothecium; asci elongato-cylindrical, 4, 6, or 8 spored; spores elliptical-oblong, or subfusiform, from quadrilocular becoming irregularly multilocular, uncoloured. Thallus crustaceous, uniform.

1. GYALECTA CUPULARIS, (*Ehrh.*) Thallus effuse, thin, somewhat

leprose, greyish-green, or grey and more or less tinged with rose. Apothecia of a medium size, numerous, superficial, at first subglobose, closed, afterwards urceolate; disc salmon-coloured, surrounded by a thin, tumid, subradioso-rugose margin, which eventually becomes explanate and somewhat pulverulent; asci elongato-cylindrical, 4, 6 spored; spores elliptical-oblong, often difformed by compression in the asci, normally quadrilocular, at length multilocular, more or less filled with a finely granular protoplasm, subhyaline; ·004 to ·0045 in. long, by ·002 in. broad. PLATE 3. *fig.* 59.

Gyalecta cupularis, Ehrh.—Fries L. Ref. 195.—Schær. Enum. 94, L. H. 135!—Leight. Brit. Angi. Lich. pl. 13. fig. 1, Exs. 122!—Hepp. Eur. 142!—Massal. Ric. 145. fig. 283.—Kbr. S. L. G. 172.—*Lichen marmoreus*, Sm. E. Bot. 739.—*Lecidea marmorea*, Hook. Brit. Fl. 2. 184.—*Lecidea cupularis*, Nyl. Enum. Gen. 119.

On moist rocks, chiefly such as are calcareous, in mountainous and subalpine districts; frequent. Its spermogones are both of rare occurrence and very difficult to distinguish. They are minute, papillæform; prominent, nearly of the same colour as the young apothecia, sparingly scattered, most numerous on the central parts of the thallus, and on such specimens as appear rugose. The spermatia are exceedingly abundant, issuing in a dense cloud, short cylindrical, straight, ·001 in. long, by ·00012 in. broad.

2. GYALECTA FOVEOLARIS, (*Ach.*) Thallus effuse, leproso-spongiose, greenish-grey, or grey. Apothecia small, numerous, crowded, immersed in the leprose thallus; disc urceolate, pale yellow, or yellowish-rose, surrounded by a rather thick, entire, paler coloured margin; asci elongato-cylindrical, 4 to 6 spored; spores uniserial, linear-oblong, or elliptical-oblong, from quadrilocular becoming irregularly multilocular, subhyaline; ·003 to ·004 in. long, by ·0015 in. broad.

Urceolaria foveolaris, Ach. Meth. 149.—*Gyalecta Wahlenbergiana*, Ach. Syn. 9.—Leight. Exs. 123!—*Gyalecta cupularis*, *β. foveolaris*, Fries L. Ref. 196.—*G. foveolaris*, Schær. Enum. 94, L. H. 293!—Massal. Ric. 146. fig. 284.—Kbr. S. L. G. 172.—*Lecidea foveolaris*, Nyl. Enum. Gen. 119.

On the ground, in moist turfy places, and on mosses among rocks, etc. Teesdale! Durham, *Rev. J. Harriman.* On moss near Boltby! Thirsk, Yorkshire, *I. G. Baker, Esq.* Near Newton! Cleveland.

3. GYALECTA TRUNCIGENA, (*Ach.*) Thallus effuse, thin, granuloso-leprose, greyish-green, often nearly obliterated. Apothecia minute, numerous, subimmersed; disc urceolate, yellowish, or pale flesh-coloured, surrounded by an obtuse, somewhat crenulated margin; asci cylindrico-clavate, 8 spored; spores elliptical-oblong, ovate, or subfusiform, from quadrilocular becoming irregularly multilocular, subhyaline; ·004 to ·00475 in. long, by ·0015 to ·00175 in. broad.

Gyalecta Wahlenbergiana, var. *truncigena*, Ach. L. Univ. 152.—Leight. Exs. 147!—*Lecidea rosella*, var. *truncigena*, Schær. Enum. 142. and *L. cornea*, var. *abstrusa*, Schær. Enum. 325.—*Gyalecta truncigena*, Hepp. Eur. 27!—*Bacidia abstrusa*, Kbr. S. L. G. 187.—*Lecidea truncigena*, Nyl. Enum. Gen. 119.

On the trunks of trees, especially elms. Derryquin! Co. Kerry, *Dr. Taylor.* Ingleby! Kildale! and near Stokesley! Cleveland, Yorkshire.

TRIBE 7. LECIDEACEÆ, (*Fries.*)

Thallus variously crustaceous; in the superior genera squamulose, bullato-plicate, or effigurate at the circumference; in the inferior genera crustaceous, uniform; hypothallus for the most part persistent, in a few species altogether wanting. Apothecia patellæform, innate, or sessile, often becoming cephaloid, and sometimes difformed; margined by a ceraceous, or a carbonaceous proper exciple, and at times furnished with an accessory thallodal one.

The present tribe is one of the most interesting in the whole class of Lichens; consisting of a very large number of elegant, though minute, species. They are widely diffused, and may be found at almost any altitude from the coast-line to the summits of our highest mountains, germinating on the earth, on rocks and stones, and on the bark of both old and young trees, bespangling and diversifying the ashy hue of their trunks with their beautifully coloured or black shield-like apothecia. On account of the great number of species of which it is composed, various arrangements of classification have been propounded by different writers. ACHARIUS, arranged nearly the whole of the species into one genus, assigning to it the comprehensive name *Lecidea,* form λεκις a kind of small shield, and ειδος form, the character of the apothecia, and then subdivided them into sections, founded either on the nature of the thallus, or on the colour of the apothecia. FRIES, divided the species into two genera, *Biatora,* and *Lecidea,* founding them on the colour of the apothecia and nature of the excipulary margin. SCHÆRER, adopted the genus *Lecidea* entire, arranged the species in sections and subsections. HEPP, divides the species into three genera, *Biatora, Myriosperma,* and *Lecidea,* distinguishing the first genus, and the last, by the colour of their spores, and the second one, by the size and number of spores in each ascus. NYLANDER, arranges the whole of the species into one genus, in conjunction with the species constituting the genus *Gyalecta,* under the old name *Lecidea,* and then subdivides them into numerous sections. MASSALONGO, and KOERBER, arrange the species into many genera, each being founded on a combination of the nature of the thallus, colour and structure of the apothecia, and the form, internal organization, and colour of the spores. Having found the arrangement of the last mentioned Lichenists to be the most practicable, and to my mind the most natural, I have adopted several of their genera entire, united a few of them, which appeared to me to be wholly unnecessary, and altered others so as to be more consistent with the general arrangement.

SUBTRIBE 1. PSORINEÆ, (*Kbr.*)

Thallus squamulose, bullato-plicate, or effigurate at the circumference. Apothecia patellæform, often difformed, margined by a proper exciple, or by a thallodal exciple, which becomes converted into a proper one.

GENUS 1. DIPLOICIA, (*Massal.*)

Apothecia erumpent, open, normally patellæform, margined by a black cupular proper exciple; thalamium arising from a brown grumous simple hypothecium; asci broadly clavate, 8 spored; spores elliptical-oblong, or oblong, bilocular, dark-olive, Thallus rugoso-plicate, foliaceo-effigurate at the circumference.

1. DIPLOICIA CANESCENS, (*Dicks.*) Thallus adnate, orbicular, subtartareous, rugoso-plicate in the centre, and often sorediiferous, lobed at the circumference, glaucous white. Apothecia (not commonly present,) small, very numerous, central; disc depressed, at first cæsio-pruinose, afterwards naked, black, surrounded by a thin entire black margin; asci broadly clavate, 8 spored; spores elliptical-oblong, or oblong, bilocular, dark-olive; ·0025 to ·003 in. long, by ·001 to ·00125 in. broad. PLATE 3. *fig.* 60.

Lichen canescens, Dicks.—Sm. E. Bot. 582.—*Lecidea canescens*. Ach. Syn. 54.—Fries L. Ref. 284.—Schær. Enum. 105, L. H. 576!—Leight. Exs. 62!—Nyl. Enum. Gen. 123.—*Placodium canescens*, Hook. Brit. Fl. 2. 197—*Diploicia canescens*, Massal. Ric. 86. fig. 177.—Kbr. S. L. G. 174.

On the trunks of trees, old walls, rocks, etc.; frequent. The apothecia of this species are not often met with. Its spermogones also are of very rare occurrence; they are very minute, black, punctiform, slightly prominent, seated on the convexities of the thallus, but chiefly on those occupying a central position. The spermatia are not very abundant, rather large, straight, cylindrical, ·00175 in. long, by ·0002 in. broad.

GENUS 2. PSORA, (*Hall.*)

Apothecia open, patellæform, sessile, at first plane, afterwards plano-convex, or cephaloid, margined by a thallodal exciple, which becomes converted into a ceraceous proper exciple; thalamium arising from a thick grumous brown, or dark reddish-brown, simple hypothecium; asci clavate, or subclavate, 8 spored; spores oblong, or ovate, unilocular, uncoloured. Thallus squamuloso-crustaceous; squamules more or less crowded, forming a variously plicated crust.

1. PSORA OSTREATA, (*Hoffm.*) Thallus membranaceous, squamulose glaucous, or pale olive; squamules reniform, ascending, scattered or crowded and imbricated, crenate, their margins and under side pulverulent. Apothecia small, sparingly scattered, sessile, seated near the base of the squamules; disc plane, black, cœruleo-pruinose; margin thin, somewhat flexuose, of the same colour as the thallus when young, afterwards black; paraphyses conglutinate, pale yellowish-brown when viewed in masses, hyaline when isolated; hypothecium thick, dark-brown; asci very minute, subclavate, 8 spored; spores elliptical, unilocular, hyaline; ·001 in. long, by ·0005 in. broad.

Psora ostreata, Hoffm.—Massal. Ric. 94. fig. 195.—Kbr. S. L. G. 176.—*Parmelia ostreata*, Fries L. Ref. 94.—Leight. Exs. 50!—*Lichen scalaris*, Sm. E. Bot. 1501.—*Psora scalaris*, Hook. Brit. Fl. 2. 192.—*Lecidea ostreata*, Schær. Enum. 97, L. H. 467!

On dead wood, old pales, etc.; common in mountainous districts. Its apothecia are very rarely produced; I have only met with them once. On old oaks, in Oggeray Gill! Cleveland, Yorkshire.

2. PSORA CARADOCENSIS, (*Leight.*) Thallus cartilaginous, glebuloso-squamulose, greenish-olive when moist, brown when dry; squamules smooth, adnate, plano-convex, crowded and slightly imbricated, their margins rounded, entire, or slightly crenate. Apothecia small, numerous, often confluent and difformed, sessile; disc plane, naked, rugulose, black, surrounded by a thin flexuose margin of the same colour; paraphyses conglutinate, yellowish-brown when viewed in masses; hypothecium

dark-brown; asci inconspicuous; spores elliptical, or ovate, unilocular, hyaline; ·0015 in. long, by 00075 in. broad. PLATE 3, *fig.* 61.

Lecidea Caradocensis, Leight, Exs. 160.—Nyl. Enum. Gen. 126.

On old dead trees, especially oaks, in mountainous districts. Caer Caradoc! Shropshire, *Rev. W. A. Leighton.* Near Thirsk! *I. G. Baker, Esq.* Rosedale! Farndale! Westerdale! and Kildale! all in the North-east of Yorkshire. The present species is closely allied to the preceding one, both in its habit and general appearance, but is distinguished from it, by its squamules being cartilaginous, smooth, adnate, never pulverulent, and by its apothecia being much more abundantly produced, black, naked, rugulose, and surrounded by a flexuose margin. Its spermogones are both extremely common and abundant; they bear a general resemblance to the young apothecia, and are indiscriminately scattered over the surface of the thallus similar to these fruits; they are prominent, verrucæform, black, isolated and evenly scattered, or confluent and grouped in irregular sized masses, causing the thallus to have a blackened appearance. The spermatia are tolerably numerous, but not abundant, ellipsoid, or subcylindrical, straight, ·0005 to ·00075 in. long, by ·00012 in. broad.

3. PSORA LURIDA, *(Swartz.)* Thallus imbricato-squamose, cæspitose, greenish-brown when moist, dark-brown when dry; scales suborbicular, smooth, sinuato-lobed; hypothallus black. Apothecia small, sparingly scattered, adnate; disc at first plane, reddish-brown, afterwards covex, black; margin thin, somewhat flexuose, concolorous with the thallus when young, subsequently black; paraphyses conglutinate, yellowish-brown when viewed in masses; hypothecium thick, grumous, dark reddish-brown; asci clavate, 8 spored; spores elliptical, or oblong, unilocular, hyaline; ·002 to ·0025 in. long, by ·001 to ·00125 in. broad.

Lichen luridus, Swartz.—Sm. E. Bot. 1239.—*Biatora lurida,* Fries L. Ref. 253.—Hepp. Eur. 121!—*Lecidea lurida,* Schær. Enum. 96, L. H. 157!—Nyl. Enum. Gen. 120.—*Psora lurida,* Massal. Ric. 90.—Kbr. S. L. G. 176.

On the ground, fissures of rocks, etc., in alpine districts. Teesdale! Durham, *Rev. J. Harriman.* Ben Lawers! *Admiral Jones.* Malham! *Dr. Carrington.* The spermogones of this species are not of unfrequent occurrence, but they are rather difficult to detect, on account of the dark colour of the thallus and their resemblance to young apothecia. They are of a medium size, not very numerous, scattered, solitary, mostly seated about the superior margins of the squamules, verrucæform, semi-immersed, dark-brown, becoming black. The spermatia are exceedingly abundant, issuing in a dense cloud, ellipsoid, or subcylindrical; ·001 in. long, by ·00025 in. broad.

4. PSORA GLOBIFERA, *(Ach.)* Thallus squamose, imbricated, greenish-chestnut coloured; scales somewhat reniform, slightly polished, rugose, their margins lobed or crenate; under side brownish white. Apothecia small, elevated, solitary, or grouped, subglobose, from dark-brown becoming black, subimmarginate; paraphyses conglutinate, pale, their apices dark-brown; hypothecium rather thick, dark greenish-brown, or nearly black; asci subclavate, 8 spored; spores elliptical, unilocular, hyaline; ·0015 in. long, by ·00075 in. broad.

Lecidea globifera, Ach. L. Univ. 213.—Schær. Enum. 97, L. H. 158!—Nyl. Enum. Gen. 120.—*Biatora globifera*, Fries L. Ref. 254.—*Psora globifera*, Massal. Ric. 91, fig. 186.—Kbr. S. L. G. 178.

In the fissures of rocks in alpine districts. Arthur's Seat! near Edinburgh, *Dr. Maingay.* This species approaches the preceding one in habit and appearance; but the scales of its thallus are usually smaller in size, less imbricated, and more friable Its apothecia also are more convex, and more elevated.

5. PSORA GLAUCOLEPIDEA, (*Nyl.*) Thallus membranceous, squamulose, pale green when moist, glaucous when dry, squamules more or less scattered, ascending, rounded, their margins inciso-lobed and crenate, and often sprinkled with small cinereo-sorediiferous excrescences. Apothecia rather large, sparingly produced, adnate, solitary; disc reddish-brown when wet, reddish-black when dry, convex, or somewhat cephaloid, generally minutely depressed in the centre; margin obliterated; hypothecium thick, pale brown, of a subtartareous nature when dry, submucose when wet; asci clavate, 8 spored; spores ovate, or elliptical, unilocular, hyaline; ·0015 in. long, by ·0005 to ·00075 in. broad. PLATE 3, *fig.* 62.

Lecidea glaucolepidea, Nyl. Enum. Gen. Suppl. 337.—Carroll in Nat. Hist. Rev. 10mo. 1859. page 526. pl. 32. fig. 2. 3. *a, b, c.*

On the ground, on moors, about the roots of heath, etc. On the south side of Crochan Mountain! Co. Antrim, *D. Moore, Esq.*, in herb. *I. Carroll, Esq.* This is a very distinct species, and one which cannot be easily confounded with any other. Its thallus in a sterile state, as regards colour and mode of growth, resembles those of *Normandina viridis*, and *jungermanniæ*, but differs from them by its squamules being distinctly inciso-lobed and crenate at their margins, and by being more or less sorediiferous.

6. PSORA DECIPIENS, (*Ehrh.*) Thallus squamose, appressed, reddish flesh-coloured; scales subpeltate, slightly concave or flat, distinct, scattered, their margins and under side white. Apothecia minute, not numerous, scattered, marginal, adnate; disc at first plane, afterwards convex, or subglobose, black; margin when young thin, entire, greyish, eventually evanescent; paraphyses subconglutinate; hypothecium thick, brown; asci clavate, 8 spored; spores oblong, or ovate, unilocular, hyaline; ·003 in. long, by ·00125 in. broad.

Lichen decipiens, Ehrh.—Sm. E. Bot. 870.—*Biatora decipiens*, Fries L. Ref. 252.—Hepp. Eur. 120!—*Psora decipiens*, Hook. Brit. Fl. 2. 193.—Massal. Ric. 91, fig. 188.—Kbr. S. L. G. 177.—*Lecidea decipiens*, Schær. Enum. 95, L. H. 164!—Nyl. Enum. Gen. 123.

On the earth in alpine districts. Teesdale! Durham, *Rev. J. Harriman.* Ben Lawers! *Dr. Maingay.* The present species is easily recognised, on account of the peculiar colour of its thallus.

7. PSORA ATRO-RUFA, (*Dicks.*) Thallus subcartilaginous, at first contiguous, afterwards areolato-lobed, or squamulose, greenish-brown when growing; greyish-white when dry; squamules adherent by the whole of their under surface, smooth, angular, and at times somewhat imbricated. Apothecia small, not very abundant, adnate; disc at first plane, afterwards tumid, reddish-brown; margin thin, distinct when

young, concolorous with the disc, eventually more or less obliterated; asci oblongo-clavate, 8 spored; spores oblong, or ovate, unilocular, subhyaline or hyaline; ·002 to ·0025 in. long, by ·001 in. broad.

Lichen atro-rufus, Dicks.—Sm. E. Bot. 1102.—*Psora atro-rufa,* Hook. Brit, Fl. 2. 192.—Massal. Ric. 92. fig. 189.—*Biatora atro-rufa,* Fries L. Ref. 255.—Hepp. Eur. 122!—Kbr. S. L. G, 194.—*Lecidea atro-rufa,* Ach. Syn. 51.—Schær. Enum. 96, L. H. 171!—Nyl. Enum. Gen. 121

On the ground, on heaths in alpine districts. Teesdale! Durham, *Rev. J. Harriman.* Farndale Moor! Yorkshire.

Genus 3. Thalloidima, *(Massal.)*

Apothecia open, patellæform, margined by a subceraceous thallodal exciple, which becomes converted into a proper one; thalamium arising from a simple or double hypothecium; (superior thin, pale; inferior grumous, reddish-brown;) asci subclavate, 8 spored; spores oblong, subfusiform, or clavato-fusiform, bilocular, subhyaline or hyaline. Thallus cartilaginous, squamulose, for the most part forming a bullate, or rugoso-plicate crust; hypothallus mostly black.

1. Thalloidima sublurida, (*Nyl.*) Thallus subcæspitose, imbricato-squamose, dark-olive when wet, olive-brown when dry; scales suborbicular, sinuato-lobed, smooth, their margins crenato-lobed. Apothecia small, scattered, sparingly produced, adnate to the disc of the scales; disc at first plane, pale-brown, afterwards convex, dark-brown; margin smooth and entire when young, slightly crenulated when mature, nearly of the same colour as the disc; hypothecium, pale-yellow, grumous; paraphyses conglutinate; asci 8 spored; spores oblong, or ovate, bilocular, hyaline; ·0025 to ·003 in. long, by ·001 in. broad.

Lecidea sublurida, Nyl. Enum. Gen. Suppl. 337.

In the fissures of rocks. Ardglass! Co. Down, *Dr. Maingay.* Near Cork, *I. Carroll, Esq.* This species resembles in its external appearance, states of *Psora lurida,* but differs from it internally, by the colour of its hypothecium, and by the internal organization of its spores. Its spermogones are apparently of common occurrence. They are verrucæform, solitary, or congregated together into little groups, prominent, pale brown, or nearly concolorous with the thallus, usually seated on the margins of the squamules. The spermatia are very abundant, issuing in a dense cloud, short, ellipsoid, or subcylindrical, ·00075 in. long, by ·00016 in. broad.

2. Thalloidima candidum, (*Web.*) Thallus tartareo-farinose, white, rugoso-plicate in the centre, lobed at the circumference; hypothallus spongiose, black. Apothecia of a medium size, appressed; disc black, cæsio-pruinose, plane, becoming more or less convex; margin smooth and even when young, afterwards flexuose; hypothecium thick, subgrumous, reddish-brown; paraphyses subconglutinate, their apices black; asci subclavate, 8 spored; spores elongato-elliptical or subfusiform, straight or slightly curved, bilocular, hyaline; ·004 to ·005 in. long, by ·00075 in. broad.

Lichen candidus, Web.—*Lecidea candida,* Fries L. Ref. 285.—Schær. Enum. 103. L. H. 167!—Nyl. Enum. Gen. 123.—*Thalloidima candidum,* Massal. Ric. 96. fig. 197.—Kbr. S. L. G. 179.—*Biatora candida,* Hepp. Eur. 124!

In the fissures of rocks, on decayed mosses, and on the ground, in alpine districts. Head of Lough-na-Cat! Highlands of Scotland, *Amiral Jones.* Stanstead! Essex, *Mr. R. Jacob.*

3. THALLOIDIMA VESICULARE, (*Hoffm.*) Thallus cartilaginous, bullato-plicate, olive-green when wet, glaucous when dry, covered with a dense coat of white-pruina. Apothecia of a medium size, scattered, subpeltate; disc black, at first plane, cæsio-pruinose; afterwards more or less convex, naked; margin obtuse, flexuose; hypothecium rather thick, reddish-brown; paraphyses somewhat lax, clavate; asci subclavate, 8 spored; spores subfusiform, bilocular, hyaline; ·003 to ·0035 in. long, by ·00075 in. broad. PLATE 3, *fig.* 63.

Psora vesicularis, Hoffm.—*Lecidea vesicularis,* Ach. Syn. 51.—Fries L. Ref. 286.—Nyl. Enum. Gen. 123.—*Lichen cæruleo-nigricans,* Lightf.—Sm. E. Bot. 1139.—*Psora cæruleo-nigricans,* Hook, Brit. Fl. 2. 192.—*Lecidea.* Schær. Enum. 191, L. H. 168!—*Thalloidima vesiculare,* Massal. Ric. 95, fig. 196.—Kbr. S. L. G. 179.—*Biatora vesicularis,* Hepp. Eur. 237!

In the fissures of rocks, and on the ground. Teesdale! Durham, *Rev. J. Harriman.* Westmoreland! *W. Brunton, Esq.* Near Bristol! *Miss Atwood.* Gogmagog Hills! Cambridge, *S. Hailstone, Esq.* Malham! *Dr. Carrington.* Near Babbicombe! *Admiral Jones.* Hurstpierpoint! Sussex, *Mr. John Hemmings.* Great Sugar-Loaf Mountain! *Mr, R. Jacob.* This species may be generally distinguished from the preceding one, its nearest ally, by the colour of its thallus, and by its more minute spores.

* 4. THALLOIDIMA MAMILLARE, (*Gouan.*) Thallus thick, tartareo-farinose, glaucous-white, areolato-verrucose and turgid in the centre, squamulose and somewhat lobed at the circumference. Apothecia rather large, elevato-sessile; disc naked, black, plane when young, afterwards convex; margin thin, entire, eventually obliterated by the swelling of the disc; hypothecium thick, dark reddish-brown or nearly black; paraphyses yellowish-red when viewed in masses; asci elongato-oblong, each containing 8 spores; spores elongato-elliptical, obscurely bilocular, hyaline; ·0025 to ·003 in. long, by ·00075 in. broad.

Lichen mamillaris Gouan. — *Lichen tumidulus,* Sm. — *Lecidea mamillare,* Fries L. Ref. 285.—Schær. Enum. 104, L. H. 575!—Nyl. Enum. Gen. 123.—*Thalloidima mamillare,* Massal. Ric. 96, fig. 198.—Kbr. S. L. G. 180.

On calcareous rocks in alpine districts. One specimen! in herb. *Harriman,* with *Turners* name attached to it, but no specified locality. The present species is a very distinct one, and in little or no danger of being confounded with any other. But as I have never heard of it, as having been met with by any recent collector, I have some doubts about its claim to rank as a British species.

GENUS 4. TONINIA, (*Massal.*)

Apothecia open from the first, patellæform, margined by a black proper exciple; thalamium arising from a thickish dark-red, or brownish-black simple hypothecium; asci clavate, 8 spored; spores sublinear-oblong, or fusiform, quadrilocular, uncoloured. Thallus squamoso-crustaceous, effigurate; hypothallus pale, often wanting.

1. **Toninia squamulosa**, (*Deak.*) Thallus cartilaginous, thin squamulose, pale olive or cream-coloured; squamules small, appressed, smooth, angular, their margins slightly lobed or crenated; hypothallus grey, or dirty-brown, often indistinct. Apothecia small, numerous, innato-sessile on the squamules, isolated, or congregated together into little groups of two, three, or more in number; disc plane, reddish-black when moist, black when dry, surrounded by a thin black margin; eventually becoming more or less convex and immarginate; hypothecium rather thick, dark-red; paraphyses somewhat stout, conglutinate, pale, their apices bluish-black; asci narrow-clavate, 8 spored; spores fusiform, or elliptico-fusiform, straight or curved, quadrilocular, hyaline; ·003 in. long, by ·001 in. broad.

Lecidea squamulosa, Deakin, M. S.—*Lecidea,—nova species, No.* 26, Salwey, Obs. Penzance, Lich. p. 144, 1853.

On rocks and walls. Upon a wall below Trengwainton, by the side of the footpath leading to the ponds! *Rev. T. Salwey.* Armagh! *Admiral Jones.* Apparently a very distinct species. "In its more perfect state it is squamulose, but in an older state, the ends of the scales having perished, the remains of them are flat, and closely appressed to the stone, and in this state they lose their colour and become white, giving the plant somewhat of the appearance of *aromatica.* The apothecia are black, the disc slightly convex, and resting either upon the scales of the thallus, or upon the hypothallus. *Salwey.*" The differently coloured hypothecium, and much smaller spores, show that this species, although allied to *aromatica,* is nevertheless distinct from it.

2. **Toninia aromatica**, (*Turn.*) Thallus subcartilagineo-tartareous, becoming rugose, glebuloso-squamulose in the centre, somewhat lobed at the circumference, greyish-white. Apothecia small, solitary and scattered, or grouped and confluent, subsessile; disc black, at first concave, surrounded by a rather thick elevated margin, afterwards convex and difformed; hypothecium thick, brownish-black; paraphyses lax, their apices black; asci clavate, 8 spored; spores sublinear-oblong, straight or curved, quadrilocular, subhyaline, or hyaline; ·004 to ·005 in. long, by ·001 in. broad. Plate 3, *fig.* 64.

Lichen aromaticus, Turn.—Sm. E. Bot. 1777.—*Lecidea aromatica,* Hook, Brit. Fl. 2, 177.—Leight. Exs. 154!—*Biatora aromatica,* Hepp. Eur. 283! *Lecidea conglomerata,* Auct. in pt.

In the fissures of rocks, old walls, etc., especially where there is a stratum of earth in the interstices. Near Eglestone! Durham, *Rev. J. Harriman.* Ardglass! Co. Down, Ireland, *Dr. Maingay.* Armagh! *Admiral Jones.* Torquay! Devonshire, *Rev. W. A. Leighton.* Near Exeter! *Mr. John Hemmings.*

Genus 5. Lecothecium, (*Trevis.*)

Apothecia produced from the hypothallus, patellæform, margined by a black cellular proper exciple, eventually tumid and subimmarginate; thalamium arising from a grumous simple hypothecium; asci linear-clavate, each containing 8 spores; spores elliptical-oblong, bi-quadrilocular, uncoloured. Thallus squamuloso-coralloid, sub-crustaceous; hypothallus spongioso-fibrillose, bluish-black.

1 LECOTHECIUM NIGRUM, (*Huds.*) Thallus effuse, or subdeterminate, minutely squamulose, from brown becoming nearly black; squamules somewhat branched and lacerato-dissected, forming a crowded diffracto-areolate coralline crust; hypothallus bluish-black, more or less extended beyond the region of the thallus. Apothecia small, scattered, numerous, solitary, sessile; disc plane, reddish-black, or black, surrounded by a smooth entire black margin; eventually tumid and subimmarginate; hypothecium rather thick, grumous, reddish-brown; paraphyses lax, their apices black; asci narrow clavate, 8 spored; spores elliptical-oblong, bilocular or quadrilocular, subhyaline or hyaline; ·003 in. long, ·001 in broad. PLATE 3, *fig.* 65.

Lichen niger, Huds.—Sm. E. Bot. 1161.—*Collema nigrum*, Ach. Sym. 308.—Hook. Brit. Fl. 2, 207.—*Parmelia triptophylla*, c. *Schraderi*, Fries L. Ref. 91, in pt.—*Lecidea triptophylla* ε. *corallinoides*, Schær. Enum. 99, L. H. 226!—*Lecothecium nigrum*, Massal. Ric. 109, fig. 215.—*L. corallinoides*, α. *nigrum*, Kbr. S. L. G. 398.—*Biatora corallinoides*, Hepp. Eur. 9!—*Pannaria triptophylla* var. *nigra*, Nyl. Enum. Gen. 109.

β. FUSCUM, (*Hepp.*) Thallus brown. Apothecia reddish-brown. Spores usually bilocular. Otherwise as above.

Biatora corallinoides, β. *fusca*, Hepp. Eur. 10!—*Lecothecium corallinoides*, β. *fuscum*, Kbr. S. L. G. 398.

On calcareous rocks in low damp situations. Ingleborough! *Dr. Carrington*, Sheep Walk, Armagh! *Admiral Jones*. Worthing! *Rev. T. Salwey*. Rivaulx! Yorkshire. Near Yarm! Cleveland. Walls near Stanhope! Durham. This species, as will be seen from the synonyms, has been arranged in various genera, according to the views entertained of it by different authors; some have regarded it as a *Collema*, others as a *Parmelia*, or a *Lecidea*, and some others have assigned to it a seperate genus. With this last view I entirely concur, as both the structure of its apothecia, and the internal organization of its spores, indicate very clearly, that it is neither a *Parmelia*, nor a *Collema*. DR. NYLANDER apparently regards it as a state of *Pannaria triptophylla*, but I must confess my inability to see any good reasons for so doing; unless, indeed, we disregard the characters furnished by the exciple and spores. Its spermogones are not of very frequent occurrence; they are also exceedingly difficult to detect. They are nearly concolorous with the thallus, subpapillæform, indiscriminately scattered over the face of the thallus. The spermatia are extremely abundant, issuing in a long continued stream, short, cylindrical, straight. ·001 in. long, by ·00012 in broad.

SUBTRIBE 2. LECIDINEÆ.

Thallus crustaceous, uniform; hypothallus various. Apothecia patellæform, often becoming cephaloid, and immarginate.

GENUS 6. BIATORINA, (*Massal.*)

Apothecia open from the first, patellæform, margined by a ceraceous, or a carbonaceous proper exciple, becoming hemispherical or globose; thalamium arising from a pale carnoso-grumous, or brownish-black, simple hypothecium; asci oblongo-clavate, or clavate, 8 spored; spores oblong, or elliptical-oblong, bilocular, uncoloured. Thallus crustaceous, uniform; hypothallus various; often wanting.

The species constituting the present genus, are principally distinguished by their bilocular spores.

SECT. A.—*Apothecia coloured; never truly black from the first.*

1. BIATORINA PINETI, (*Schrad.*) Thallus effuse, very thin, leprous, green when recent, greyish-white when dry. Apothecia minute, numerous, scattered, sessile; disc at first concave, afterwards plane, pale flesh-coloured, surrounded by a pale smooth margin; asci linear, subcylindrical, 8 spored; paraphyses lax, flexuose; spores elliptical-oblong, bilocular, hyaline; ·002 in. long, by ·0005 in. broad.

Lichen pineti, Schrad.—*Lichen effusus*, Sm. E. Bot. 1863 two lower fig.—*Lecidea pineti*, Ach. Syn. 41.—Hook. Brit. Fl. 2. 183.—Nyl. Enum. Gen. 120.—Schær. Enum. 141, L. H. 218!—*Biatora vernalis*, d. *pineti*, Fries L. Ref. 261.—*Gyalecta pineti*, Leight. Exs. 89!—*Biatorina pineti*. Massal. Ric. 135. fig. 264.—Kbr. S. L. G. 189.

On the bark of firs, especially near their bases; common in mountainous districts.

2. BIATORINA GRIFFITHII, (*Sm.*) Thallus effuse, thin, membranceo-subcartilaginous, smooth, becoming granuloso-leprous, greyish-white. Apothecia minute, numerous, scattered or crowded, adnate; disc when young plane, afterwards convex, from pale-brown becoming brownish-black; margin thin, pale, evanescent: hypothecium pale, carnose; paraphyses conglutinate; asci small, subclavate, 8 spored; spores oblong, or elliptical-oblong, more or less attenuated toward each extremity, bilocular, hyaline; ·0025 to ·003 in. long, by ·0075 in. broad.

Lichen Griffithii, Sm. E. Bot. 1735, and *Lichen cyrtellus*, Sm. E. Bot. 2155 in pt.—*Lecidea Griffithii* and *Lecidea anomala*, Hook. Brit. F. L. 2. 177, 182 in pt.—*Biatora mixta*, Fries L. Ref. 268.—Leight. Exs. 60!—*Lecidea anomala* vars. *cyrtella*, and *Griffithii*, Schær. Enum. 138, 139, in pt. L. H. 473!—*Biatorina Griffithii*, and *cyrtella*, Massal. Ric. 134.—Kbr. S. L. G. 190, 191.—*Biatora anomala*, Hepp. Eur. 18!

On the trunks of young trees, mostly ash, in damp shady woods. Gopsall! Leicestershire, ex. herb. *Rev. W. A. Leighton*. Near Cork! *I. Carroll, Esq.* Airyholme Wood! near Ayton, Cleveland. This species, I believe, has frequently been confounded with *L. anomala*, Ach. (*Bilimbia* of this work,) and passed over as a state of it; but its spores, spermogones, and spermatia, show, however closely allied in habit and external appearance, that they are really distinct species. The spermogones of the present species are nearly concolorous with the thallus, minute, subverrucæform, slightly prominent, solitary, indiscriminately scattered over the face of the thallus. The spermatia are cylindrico-arcuate, more or less attenuated toward the extremities, ·003 to ·0035 in. long, by ·00016 in. broad. I cannot see, however, any good character whereby *Griffithii* and *cyrtella* can be distinguished even as varieties. They appear to me to be the same plant, in a different stage of growth.

3. BIATORINA EHRHARTIANA, (*Ach.*) Thallus effuse, cartilaginous,

rugoso-verrucose, greenish-white, or straw coloured. Apothecia small, numerous, adnate; disc yellowish buff-coloured, at first plane and regular, afterwards convex and irregular; margin thin, subevanescent; asci subulato-clavate, 8 spored; spores linear-oblong, straight, or slightly curved, faintly bilocular, hyaline; ·002 to ·003 in. long, by ·00075 in. broad.

Lichen Ehrhartianus, Ach. Prod.—Sm. E. Bot. 1136.—*Lecidea Ehrhartiana*, Ach. Syn. 47.—Hook. Brit. Fl. 2. 185.—*Parmelia varia*, var. *parasitica*, and *Cliostomum corrugatum*, Fries L. Ref. 159. 455.—*Lecanora varia*, γ. and δ. Schær. Enum. 82, L. H. 326! and 192!—*Biatora Ehrhartiana* and *Pyrenothea corrugata*. Massal. Ric. 127 and 151.—*Biatora Ehrhartiana*, Kbr. S. L. G. 204.

On old timber, especially such as has long been exposed to the weather. Near Yarmouth! *D. Turner, Esq.* The spermogones of this species are usually present. They are the black corpuscles which occur on its thallus, and which FRIES regarded as a *Cliostomum*,—LEIGHTON as a *Fungus*,—SCHÆRER as a variety of *Lecanora varia*,—and MASSALONGO as a *Pyrenothea*. However there can be little or no doubt but that they are the spermogones of the present species. They are irregularly scattered over the face of the thallus, verrucæform, solitary or confluent, prominent, black. The spermatia are very abundant, linear-oblong, or ellipsoid, ·0005 to ·00075 in. long, by ·0002 in. broad.

4. BIATORINA LUTEA, (*Dicks.*) Thallus effuse, very thin, leprous, greyish-white. Apothecia of a medium size, sessile, scattered; disc from concave becoming plano-convex, deep yellow, or yellowish-orange; margin thin, smooth, rather paler in colour than the disc, becoming flexuose, or nearly obliterated; hypothecium thick, pale carnose; paraphyses conglutinate; asci minute, 8 spored; spores oblong, or elliptical-oblong, faintly bilocular, occasionally unilocular, hyaline; ·0025 in. long, by ·0005 to ·00075 in. broad.

Lichen luteus, Dicks.—Sm. E. Bot. 1263.—*Lecidea lutea*, Borr. in Hook. Brit. Fl. 2. 185.—Schær. Enum. 147.—Nyl. Enum. Gen. 120.

On the trunks of old trees, encrusting mosses, &c. On hawthorn, near Cork! *I. Carroll, Esq.* Penzance! *Rev. T. Salwey.*

5. BIATORINA SPHÆROIDES, (*Dicks.*) Thallus effuse, thin, leprous, or ruguloso-granulose, dull olive-green when moist, greyish-white when dry, Apothecia of a medium size, numerous, sessile, solitary, or conglomerated; disc at first plane, pale brown, surrounded by a very thin smooth margin, afterwards globose, and immarginate; hypothecium rather thick, pale, carnose; paraphyses conglutinate; asci narrow clavate, 8 spored; spores elliptical-oblong, bilocular, hyaline; ·0025 to ·0035 in. long, by ·001 in. broad. PLATE 3, *fig.* 66.

Lichen sphæroides, Dicks.—*Lecidea vernalis*, Hook. Brit. Fl. 2. 183 in pt.—*Lecidea sphæroides*, α. *albella*, Schær. Enum. 139.—*Biatorina sphæroides*, Massal. Ric. 135. fig. 266.

On the trunks of trees, encrusting mosses, etc., in damp shady woods. Florence Court! *Admiral Jones.* Near Ripon! *Mr. W. Brunton.* Barmouth! *Rev. T. Salwey.* On elms near Rievaulx! Bilsdale, Yorkshire. This species resembles states of *Bacidia rubella*, and *Lecidea conglomerata*, in its external appearance, and unless recourse be had to its spores, it is not at all times distinguishable from them.

6. BIATORINA ATRO-PURPUREA, (*Schær.*) Thallus effuse, thin, granuloso-leprous, greenish-grey. Apothecia minute, scattered, sessile; disc plane or tumid, reddish-brown when wet, purplish-black when dry; margin thin, entire, eventually obliterated; hypothecium carnoso-grumous, yellowish-brown; paraphyses rather lax, fluxuose, their apices reddish-brown; asci clavato-ventricose, 8 spored; spores elliptical, or ovate, bilocular, hyaline; ·003 to ·0035 in. long, by ·001 to ·00125 in. broad.

Lecidea sphæroides, δ. atro-purpurea. Schær. Enum. 140. L. H. 206! in pt.—*Biatorina atro-purpurea,* Massal. Ric. 135. fig. 265.—*Biatora atro-purpurea,* Hepp. Eur. 279!

On the trunks of pine trees, especially silver fir, and black spruce, in mountainous woods. Stanstead Park! Essex, *Mr. R. Jacob.* This is apparently distinct from the preceding species; it may be known by its thin thallus, and by the colour of its apothecia.

7. BIATORINA PYRACEA, (*Ach.*) Thallus effuse, very thin, leprous, or subpulverulent, greyish-white; often evanescent. Apothecia small, numerous, scattered, sessile; disc plane, orange-coloured, surrounded by a very thin smooth margin, eventually convex and immarginate; hypothecium thin, pale; paraphyses rather lax; asci oblongo-clavate, 8 spored; spores elliptical-oblong, bilocular, subhyaline. or hyaline; ·002 to ·003 in. long, by ·001 in. broad.

Lecidea aurantiaca, γ. pyracea, Ach. Syn. 49.—*Lichen rupestris,* Sm. E. Bot. 2245.—*Lecidea irrubata,* Hook. Brit, Fl. 2. 183.—*Biatora rupestris,* var. *irrubata,* Leight. Exs. 213!—*Biatorina pyracea,* Massal. Ric. 136. fig. 268.—Kbr. S. L. G. 190.

On rocks and walls. Old walls at Beamish! Durham, *Rev. J. Harriman.* On the Church-yard wall at Ingleby! and on walls near Ayton! Cleveland, Yorkshire. The internal organization of the spores, show that this species is distinct from all the states of *Lecidea rupestris.*

8. BIATORINA HOLOMELÆNA, (*Hepp.*) Thallus effuse, thin, subrimulose, leproso-granulose, grey, or greyish-white. Apothecia minute, scattered, sessile; disc plano-convex, pale-brown when moist, dark reddish-brown when dry, surrounded by a very thin smooth margin; hypothecium thin, grumous, pale reddish-brown; paraphyses lax; asci short, clavate, 8 spored; spores elliptical-oblong, bilocular, hyaline; ·002 to ·0025 in. long, by ·00075 in. broad.

Biatora holomelæna, Hepp. Eur. 12!—*Lecidea holomelæna,* Schær. Enum. 134, L. H. 536! in pt. and *Lecidea punctata,* var. *stigmatea,* Schær. Enum. 130.

On rocks and stones. Near Kenmare! Ireland, *I. Carroll, Esq.* Near Armagh! *Admiral Jones.* Near Roseberry! Cleveland, Yorkshire. Its spermogones are usually present. They are exceedingly minute, punctiform, semi-immersed, dark-brown, irregularly scattered over the whole surface of the thallus. The spermatia are extremely minute, ellipsoid, ·0002 to ·00025 in. long, by ·00012 in. broad.

9. BIATORINA MUDDII, (*Salw.*) Thallus subdeterminate, cartilagineo-tartareous, smooth, subcolliculoso-areolate, olive-green. Apothecia minute, numerous, scattered, innato-sessile; disc plane, from pale-brown becoming dark reddish-brown; margin very thin, smooth, eventually evanescent; hypothecium thin, pale brown, subgrumous; paraphyses

lax, slender, hyaline; asci clavate, 8 spored; spores elliptical-oblong, or ovate, bilocular, hyaline; ·003 to ·0035 in. long, by ·001 to ·0015 in. broad.

Lecidea Muddii, Salwey in litt. 1860.

On rocks near Newlyn! Cornwall, *Rev. T. Salwey.* The thallus of this plant bears considerable resemblance to that of *Pertusaria communis*, and apparently expands over the face of the rock, in a similar manner to it. Its spermogones are very abundant. They are excessively minute, wholly invisible without the aid of a good lens, punctiform, immersed, brownish-black, indiscriminately scattered over the face of the areolæ. The spermatia are numerous, cylindrical or subellipsoid, ·00075 in. long, by ·00012 in. broad.

SECT. B.—*Apothecia black.*

10. BIATORINA SYNOTHEA, *(Ach.)* Thallus effuse, very thin, minutely granulose, greyish-green when moist, greyish-white or brown when dry. Apothecia minute, very numerous, often crowded, sessile; disc convex, livid-black, subimmarginate; hypothecium thin, pale. grumous; asci minute, clavate, 8 spored; spores elliptical-oblong, or ovate, straight or slightly curved, bilocular, hyaline; ·002 to ·00275 in. long, by ·0075 in. broad.

Lecidea synothea, Ach. Syn. 26.—Borr. in E. Bot. Suppl. 2711.—Hook. Brit. Fl. 2. 179.—Schær. Enum. 134.—*Biatora denigrata*, Fries L. Ref. 270.—*Biatora synothea*, Hepp. Eur. 14!

On old pales, dead trees, etc., in shady situations. Near Marske! Cleveland.

11. BIATORINA LIGHTFOOTII, (*Sm.*) Thallus suborbicular, pulvinate, tartareous, granuloso-verrucose, greenish-white. Apothecia of a medium size, sessile on the granules, or in the interstices; disc plane or slightly convex, somewhat polished, black; margin at first thin, smooth, and entire, afterwards more or less undulated; hypothecium pale, grumous; paraphyses conglutinate; asci clavate, each containing 8 spores; spores linear-oblong, faintly bilocular, the extremities rounded and somewhat dilated, hyaline; ·002 in. long, by ·00075 in. broad.

Lichen Lightfootii, Sm. E. Bot. 145.—*Lecidea Lightfootii*, Ach. Syn. 34.—Hook. Brit. Fl. 2. 180.—Schær. Enum. 138.

β. COMMUTATA, *(Ach.)* Thallus suborbicular, granuloso-pulverulent, greenish-grey. Apothecia of a medium size, distantly scattered, sessile; disc brownish-black or black, plane or slightly convex, surrounded by an even, or undulated margin; spores oblong, at times slightly curved, bilocular, hyaline; ·002 in. long, by ·00075 in. broad.

Lecanora commutata, Ach. Univ. 171.—*Lecidea Lightfootii*, β. *commutata*, Schær. Enum. 138.—*Biatora commutata*, Massal. Ric. 136, fig. 269.—Kbr. S. L. G. 192.

On the trunks of trees, etc. On birch, authentic specimen! ex. herb. *Rev. W. A. Leighton.* Sussex! *Admiral Jones.* β.—On beech, near Cork! Ireland, *I. Carroll, Esq.* This variety differs from the ordinary state, by its thallus becoming dissolved and pulverulent. The spermogones of the normal form are not of unfrequent occurrence, but they are not easily detected, unless specially looked for. They are very minute, punctiform, immersed in the thallodal verrucæ, brown. The spermatia are subcylindrical, or ellipsoid, ·0005 to ·00075 in. long. by ·00012 in. broad.

12. BIATORINA PULVEREA, (*Borr.*) Thallus effuse, thick, soft, pulverulent, yellowish-green when recent, afterwards greenish-white. Apothecia rather large, scattered, sessile; disc when young, plane, black, surrounded by a slightly elevated margin; when mature more or less convex and irregular, the margin disappearing; hypothecium greenish-brown, grumous; paraphyses conglutinate; asci subclavate, 8 spored; spores elliptical-oblong, bilocular, hyaline; ·003 to ·0035 in. long, by ·00125 in. broad.

Lecidea pulverea, Borrer in E. Bot. Suppl. 2726.—Hook. Brit. Fl. 2. 181.

On the trunks of trees, generally near the ground. Authentic specimen! ex herb. *Rev. W. A. Leighton.* This is apparently a very distinct species, and one which is in little danger of being confounded with any other. Its thick pulverulent thallus, and its large black apothecia are its principal distinguishing characters. It is quite distinct from *Lichen incanus,* E. Bot. 1683.

13. BIATORINA MELASTIGMA, *Tayl.* Thallus very thin, subdeterminate, minutely subsquamuloso-areolate, greyish-green when moist, dark-brown when dry; areolæ very minute, oblong or angular, crowded, rugulose, plane or slightly convex; hypothallus black. Apothecia very minute, scattered, sessile; disc black, rugose, plane or convex, surrounded by a thin entire carbonaceous margin, which eventually disappears; hypothecium pale yellowish-brown, seated upon the carbonaceous exciple; paraphyses lax, hyaline, their apices slightly thickened, black; asci very minute, short, subclavate, 8 spored; spores elliptical-oblong or subclavate, bilocular, hyaline; ·002 in. long, by ·0005 in. broad.

Lecidea melastigma, Tayl. Fl. Hib. pt. 2, 115.

On siliceous rocks, near Dunkerron! County of Kerry, *Dr. Taylor.* This species is nearly allied to the next one, especially in the internal structure of its apothecia, and future observation may prove it to be only a variety.

14. BIATORINA CHALYBEIA, (*Borr.*) Thallus thin, subtartareous, contiguous, or minutely rimulose, varying in colour from grey to nearly black; hypothallus very thin, black. Apothecia very minute, numerous, scattered, sessile; disc plane, or slightly convex, surrounded by a thin black margin; hypothecium thin, bluish-black; paraphyses lax, their apices black; asci minute, short, subclavate, 8 spored; spores elliptical-oblong, or linear-oblong, at times slightly curved, normally bilocular, hyaline; ·002 to ·0025 in. long, by ·0005 to ·00075 in. broad.

Lecidea chalybeia, Borr. in E. Bot. Suppl. 2687, fig. 2.—Hook. Brit. Fl. 2, 176.—Schær. Enum. 117.—Nyl. L. P. 139!—*Biatora holomelæna, β. chalybeia,* Hepp. Eur. 13!—*Catillaria chalybeia,* Massal. Ric. fig. 79. 161.

On rocks and stones. Near Cork! Blackwater! and Blackstone Bridge! Ireland, *I. Carroll, Esq.* Near Rievaulx! Bilsdale, Yorkshire. Its spermogones are usually present. They are exceedingly minute, invisible without the aid of a good lens, punctiform, semi-immersed, black, numerously scattered over the whole face of the thallus. The spermatia are not very abundant, on account of the small size of the spermogones; they are ellipsoid, short, ·0005 in. long, by ·0001 in. broad.

15. BIATORINA GROSSA, (*Pers.*) Thallus somewhat thin, spreading, at first subcartilaginous, afterwards leprous, greyish-green when moist, greyish-white when dry. Apothecia large, numerous, scattered, elevato-sessile; disc when young plane, black, surrounded by a slightly polished black margin; when mature more or less convex, the margin flexuose, often obliterated; hypothecium thin dark-brown, seated upon the carbonaceous exciple; paraphyses subconglutinate; asci oblongo-clavate, large, 8 spored; spores elliptical-oblong, bilocular, at times slightly constricted in the middle, subhyaline, or hyaline; ·006 to ·007 in. long, by ·003 in. broad. PLATE 3, *fig.* 67.

Lecidea grossa, Pers.—Nyl. Enum. Gen. 126, L. P. 66!—*Lecidea leucoplaca,* Chev.—Leight. Exs. 125!—*L. premnea,* Fries L. Ref. 229.—Schær. Enum. 130 in pt.—Hook. Brit. Fl. 2, 176 in pt.—*Catillaria premnea,* Kbr. S. L. G. 231.

On the trunks of trees in moist shady woods. Blarney! Ireland, *I. Carroll, Esq.* Near Thirsk! *I. G. Baker, Esq.* Very abundant in the woods in the neighbourhood of Ayton! Cleveland, Yorkshire. The present species is well characterised by its large black apothecia, and large bilocular spores.

16. BIATORINA CONCRETA, (*Wahlb.*) Thallus somewhat determinate, thin, subtartareous, rimoso-areolate, greyish-brown; areolæ nearly flat, smooth, rather distantly scattered, or crowded together; hypothallus black. Apothecia small, scattered, not very numerous, subinnate; disc plane, or somewhat convex, black, surrounded by a thin, entire, subpersistent, black margin; hypothecium carbonaceous; paraphyses slender, diffluent; asci oblongo-clavate, 8 spored; spores elliptical-oblong, bilocular, hyaline; ·0035 to ·004 in. long, by ·0015 to ·002 in. broad.

Lecidea alboatra, β. concreta, Wahlb. Fries L. Ref. 312.—*Lecidea confervoides,* var. *concreta* Schær. Enum. 113.—*Catillaria concreta,* Massal. Ric. 79. fig. 160.—Kbr. S. L. G. 232.

On rocks, especially whinstone, in alpine districts. Near Thirsk! Yorkshire, *I. G. Baker, Esq.* This is apparently a distinct species, but unless its spores are examined, it is not easily distinguished from states of *Rhizocarpon petræum.*

GENUS 7. BACIDIA, (*De Not.*)

Apothecia normally patellæform, margined by a ceraceous, or subcarbonaceous proper exciple; often becoming hemispherical or globose and immarginate; thalamium arising from a pale carnoso-grumous, or a brownish-black carbonaceous simple hypothecium; asci elongato-clavate, or clavate, each containing 6 or 8 spores; spores acicular, or subclavato-fusiform, straight or variously undulated, 4 to 18 locular, uncoloured. Thallus crustaceous, effuse.

SECT. 1.—*Apothecia coloured, never black from the first.*

1. BACIDIA ROSELLA, (*Pers.*) Thallus effuse, thin, leproso-granu-

lose, greyish-green when moist, greyish-white when dry. Apothecia of a medium size, scattered, not numerous, sessile; disc plane, pale rose-coloured, slightly pruinose, surrounded by a rather thick, smooth, pale margin; hypothecium pale carnose; paraphyses very fine and delicate, subconglutinate; asci elongato-clavate, 6-8 spored; spores elongato-acicular, or subclavate, 6 to 18 locular, flexuose, or curved, hyaline; ·015 to ·018 in. long, by ·00075 to ·001 in. broad.

Lichen rosellus, Pers.—Sm. E. Bot. 1651.—*Biatora rosella*, Fries L. Ref. 259.—*Lecidea rosella*, Hook. Brit. Fl. 2. 184.—Schær. Enum. 141, L. H. 217!—Nyl. Enum. Gen. 122.—*Bacidia rosella*, Massal. Ric. 117. fig. 229.—Kbr. S. L. G. 185.

On the trunks of trees in shady woods. Near Ripon! Yorkshire, *W. Brunton, Esq.* Stanstead! Essex, *Mr. R. Jacob.* Easily recognised by its pale rose-coloured apothecia.

2. Bacidia rubella, (*Ehrh.*) Thallus effuse, thin, leproso-granulose, yellowish-green when moist, greyish-green when dry. Apothecia of a medium size, scattered, or congregated together into little groups, and at times confluent, sessile; disc when young plane, reddish flesh-coloured, surrounded by a thin smooth margin, afterwards convex or subglobose, and immarginate; hypothecium pale yellowish-brown; paraphyses conglutinate; asci oblongo-clavate, 6-8 spored; spores acicular, or subclavate, 12 to 18 locular, flexuose, hyaline; ·014 to ·018 in. long, by ·00075 in. broad. Plate 3, *fig.* 68.

Lichen rubellus, Ehrh.—*Lichen vernalis*, Sm. E. Bot. 845.—*Biatora vernalis*, *α. luteola*, Fries L. Ref. 260 in pt.—*Lecidea vernalis*, Hook. Brit. Fl. 2. 183 in pt.—*L. rubella*, Schær. Enum. 142, L. H. 210!—*Biatora vernalis*, Leight. Exs. 92! *B. rubella*, Hepp. Eur. 141!—*L. luteola*, Nyl. L. P. 55!—*Bacidia rubella*, Massal. Ric. 118. fig. 231.—Kbr. S. L. G. 186.

On the trunks of old trees, especially elms, in damp shady woods: common. Its spermogones are of rather rare occurrence. They are very minute, and difficult to distinguish from the thallodal granules, subpapillæform, pale yellow, sparingly scattered over the face of the thallus. The spermatia are not very numerous; they are cylindrical, curved, or undulated, very fine and delicate, ·0035 to ·004 in. long, by ·0001 in. broad.

3. Bacidia carneola, (*Ach.*) Thallus thin, at first cartilagineo-membranaceous, smooth, glaucous-white, afterwards granuloso-pulverulent. Apothecia small, sparingly produced, sessile; disc concave, naked, from reddish flesh-colour becoming reddish-brown, surrounded by an elevated smooth paler margin; hypothecium pale; paraphyses hyaline, conglutinate; asci subclavate, 8 spored; spores acicular, or subfusiform, more or less curved, 10 to 14 locular, hyaline; ·008 to ·012 in. long, by ·00075 to ·001 in. broad.

Lecidea carneola, Ach. Univ. 194.—Nyl. L. P. 132! Enum. Gen. 120.—*Lichen corneus*, Sm. E. Bot. 965.—*Lecidea cornea*, Hook. Brit. Fl. 2, 183.—*Biatora carneola*, Fries L. Ref. 264.—Leight. Exs. 117!—*L. cornea*, Schær. Enum. 142.—*Bacidia cornea*, Massal. Ric. 118, fig. 230. *B. carneola*, Kbr. S. L. G. 186.

On the trunks of old trees, chiefly oaks, in mountainous districts.

Teesdale! Durham, *Rev. J. Harriman.* Haughmond Hill! Shropshire, *Rev. W. A. Leighton.* Bolton! *Dr. Carrington.*

4. Bacidia luteola, (*Ach.*) Thallus effuse, thin, leproso-granulose, greyish-green. Apothecia minute, numerous, scattered, sessile; disc at first plane, pale yellowish-brown, surrounded by a thin smooth margin, afterwards convex or subglobose, dark-brown and immarginate; hypothecium pale yellow; paraphyses conglutinate; asci clavate, 8 spored; spores acicular, or linear-acicular, flexuose, 8 to 12 locular, hyaline; ·008 to ·012 in. long, by ·0005 in. broad.

Lecidea luteola, Ach. Syn. 41.—*Biatora vernalis, α. luteola,* and *B. anomala.* Fries L. Ref. 260 and 269, in pt.—*Biatora effusa,* Hepp. Eur. 24!—*B. luteola,* var. Leight. Exs. 279!—*Bacidia anomala,* Massal. Ric. 119, fig. 232.—Kbr. S. L. G. 188.

β. fuscella, (*Fries.*) Apothecia minute, sessile, numerous, congregated together into little groups, and eventually confluent, varying in colour from pale-brown to dark-brown. Otherwise as above.

Biatora luteola, var. *fuscella,* Fries.—Leight. Exs. 211!—*Lecidea luteola* var. *fuscella,* Nyl. L. P. 135! Enum. Gen. 122.

γ. inundata, (*Fries.*) Thallus effuse, thin, granulose, at first contiguous, afterwards somewhat areolate, pale green when wet, greyish-green when dry. Apothecia minute, numerous, solitary, scattered, subinnato-sessile; disc plano-convex, pale-brown, becoming dark-brown; margin thin, evanescent. Spores acicular, or subclavate, flexuose, 6-8 locular, hyaline; ·007 to ·011 in. long, by ·0005 in. broad.

Biatora vernalis, var. *inundata,* Fries L. Ref. 261.—*Bacidia inundata,* Kbr. S. L. G. 187.—*Lecidea luteola,* var. *inundata,* Nyl. Enum. Gen. 122.

δ. cæsiopruinosa, *Mudd.* Thallus effuse, thin membranaceous, smooth, white, at length subleproso-pulverulent, cream-coloured. Apothecia minute, numerous, more or less crowded and confluent, subinnato-sessile; disc plano-convex, pale-brown and cæsio-pruinose when young, dark-brown and nearly naked when old; margin thin, entire, eventually evanescent; asci clavate 6-8 spored; spores accicular, or subclavate, straight, curved, or undulated, 4-8 locular, hyaline; ·005 to ·008 in. long, by ·0005 to ·00075 in. broad.

Biatora luteola, var. Leight. Exs. 150!

On the trunks of trees, and rocks. α.—On trees near Cork! *I. Carroll, Esq.* Airyholme Wood! and Hoggarts Wood! Cleveland. β.—On trees, Airyholme! Cliffrig! and Ingleby Park! γ.—On rocks in the stream, in Airyholme Wood! δ.—On oaks in Stogdale! Cleveland, Yorkshire. The small brown apothecia, pale hypothecium, and the short and slender spores, are the principal distinguishing characters of these four forms.

Sect. 2.—*Apothecia reddish-black, or black.*

5. Bacidia atrogrisea, (*Delise.*) Thallus subdeterminate, thin, subcartilaginous, smooth, greyish-white, becoming at length granulose, and at times nearly obliterated. Apothecia of a medium size, sparingly scattered, sessile; disc at first plane, reddish-black, surrounded by a smooth black margin, afterwards convex, black, the margin obliterated; hypothecium reddish-brown; paraphyses conglutinate, yellowish-brown

when viewed in masses, their apices black; asci oblongo-clavate, 6-8 spored; spores acicular, or subclavate, straight, curved, or flexuose, 6 to 12 locular, hyaline; ·009 to ·014 in. long, by ·00075 in. broad.

Lecidea atrogrisea, Delise. (Herb. Schær.) fide Hepp. Eur. 26!—*Biatora premnea,* Leight, Exs. 90!—*Lecidea premnea,* Hook, Brit. Fl. 2. 176 in pt.—*Bacidia elevata,* Kbr. S. L. G. 188.—*Lecidea luteola,* var. *endoleuca,* Nyl. Enum. Gen. 122.

On the trunks of trees in shady woods. Near Shrewsbury! Shropshire, *Rev. W. A. Leighton.* Hilk's wood! Ingleborough, *Dr. Carrington.* Near Thirsk! Yorkshire, *I. G. Baker, Esq.* Airyholme! and Hoggart's wood! Cleveland. The colour of the hypothecium, shews that this species is quite distinct from all the states of *B. luteola.*

6. Bacidia incompta, (*Borr.*) Thallus effuse, thin, granuloso-pulverulent, dark-green when growing, light-green when gathered and in a dry state. Apothecia small, scattered or crowded, sessile; disc when young plane, orbicular, purplish-black, afterwards more or less convex, confluent and difformed; margin thin, fluxuose; hypothecium rather thick, reddish-black; paraphyses subconglutinate, pale reddish-brown when viewed in masses; asci clavate, 8 spored, spores acicular, or sublinear-clavate, slightly curved, 2 to 6 locular, hyaline; ·004 to ·006 in. long to ·0005 in. broad.

Lecidea incompta, Borr. in E. Bot. Suppl. 2699.—Hook. Brit. Fl. 2. 180.—Leight. Exs. 162!—*L. rubella, β. atrosanguinea,* Schær. Enum. 142 in pt.—L. H. 212! in pt. (non *L. punctata,* δ. Schær. Enum. 129.) *L. luteola,* var. *incompta,* Nyl. Enum. Gen. 122 in pt.—*Biatora incompta,* Hepp. Eur. 287!

β. atrosanguinea, (*Schær.*) Thallus as above. Apothecia small, crowded, sessile; disc at first plane, reddish-black, eventually convex, black; margin thin, slightly elevated, even, or fluxuose; hypothecium thick, reddish-black. Spores as above.

Lecidea rubella, β. atrosanguinea, Schær. Enum. 142 in pt., L. H. 212! in pt.—*Scoliciosporum molle,* Massal. Ric. 105. fig. 210.—Kbr. S. L. G. 269.—*Biatora atrosanguinea,* a. et b. Hepp. Eur. 286!

On the trunks of trees in damp situations. Sussex! ex. herb. *Rev. W. A. Leighton.* Near Exeter! Devonshire, *Mr. E. Parfitt.* On elms in Kildale! Cleveland, and in Bilsdale! Yorkshire. Both the present species and variety are distinguished from all the preceding, by their reddish-black apothecia, *thick hypothecia,* and by their short acicular and less flexuose spores. The spermogones are met with occasionally. They are very minute, invisible to the naked eye, punctiform, dark-brown, indiscriminately scattered over the face of the thallus. The spermatia are not very numerous, on account of the small size of the spermogones; they are cylindrical, slightly curved, very delicate, ·002 to ·00225 in. long, by ·0001 in. broad.

7. Bacidia muscorum, (*Swartz.*) Thallus effuse, thinnish, granuloso-verrucose, greyish-white. Apothecia of a medium size, more or less crowded, sessile; disc black, when young plane, surrounded by a very thin entire margin, when mature convex, and eventually immarginate; hypothecium rather thick, reddish-black; paraphyses conglutinate, yellowish-brown when viewed in masses; asci clavate, 8 spored; spores

acicular, or subclavate, curved or flexuose, 4 to 8 locular, hyaline ; ·006 to ·007 in. long, by ·0005 in. broad.

Lichen muscorum, Swartz.—Sm. E. Bot. 626 in pt.—*Lecidea muscorum*, Hook. Brit. Fl. 2. 177, in pt.—Leight. Exs. 190.—*L. sabuletorum, α. alpestris*, Fries L. Ref. 339 in pt.—*Biatora pezizoidea*, Hepp. Eur. 25 !—*Bacidia* . . . . . . Massal. Ric. 119, fig. 233 ?

On mosses, etc., in damp sandy places. Near Bristol ! *Miss M. Atwood.* Sand-hills, near Redcar ! Cleveland, Yorkshire. Care must be taken not to confound this with *Bilimbia sphæroides*, a species which occurs in similar localities. The *black* apothecia, *reddish-black* hypothecium, and *slender acicular* spores are the distinguishing characters of the present plant.

8. Bacidia pulvinata, (*Tayl.*) Thallus rather thick, pulvinate, granuloso-squamulose, pale greenish-brown, or cream-coloured ; squamules very minute, congregated together into small, tumid, and distantly scattered pulvinate tufts ; hypothallus rather thick, dark-brown, or nearly black. Apothecia arising from the hypothallus, small, not very numerous ; disc black, at first somewhat concave, becoming plane, surrounded by a thick black margin, eventually convex and immarginate ; hypothecium thick, dark brownish-black ; paraphyses conglutinate, rich yellowish-brown when viewed in masses ; asci clavate, 8 spored ; spores acicular, or subclavate, curved, or undulated, 6 to 10 locular, hyaline ; ·007 to ·009 in. long, by ·0005 in. broad.

Lecidea pulvinata, Tayl. Fl. Hib. pt. 2, 123.

On mosses, turfy heaths, etc., in alpine districts. County of Kerry ! *Dr. Taylor.* Barmouth ! North Wales, ex herb, *I. Carroll, Esq.* The minute pulvinate granuloso-conglomerated thallus, black hypothallus, large black apothecia, brownish-black hypothecium, and acicular spores, are the distinguishing characters of this species.

Genus 8. Scoliciosporum, (*Massal.*)

Apothecia normally patellæform, margined by a proper exciple, becoming hemispherical and immarginate ; thalamium arising from a carnose hypothecium ; asci cuneate, 8 spored ; spores very slender, anguillulæform, normally quadrilocular, uncoloured. Thallus crustaceous, effuse.

1. Scoliciosporum vermiferum, (*Nyl.*) Thallus effuse, thin, granuloso-leprose, greyish-brown, or nearly black. Apothecia minute, numerous, scattered, or crowded, sessile ; disc at first plane, brownish-black, or black, surrounded by a thin entire margin, at length hemispherical and immarginate ; hypothecium yellowish, carnose ; paraphyses conglutinate ; asci cuneate, 8 spored ; spores linear, very slender, anguillulæform, faintly quadrilocular, hyaline ; ·005 in. long, by ·00025 in. broad. Plate 3, *fig.* 69.

Lecidea holomelæna, var. *vermifera*, Nyl. L. P. 136 !—*L. holomelæna*, Flk. in pt.—Schær. Enum. 134, L. H. 536 ! in pt.—*Scoliciosporum holomelænum*, Massal. Ric. 104, fig. 209.—Kbr. S. L. G. 269.—*L. vermifera*, Leight. Exs. 158 !

On rocks and stones, and occasionally on the trunks of trees and old pales. Lyth Hill ! Shropshire, *Rev. W. A. Leighton.* On rocks in Kildale ! and near Ayton ! and on old pales near Broughton ! Cleveland, Yorkshire. This species is well characterised by the peculiar form of its spores. SCHÆRER has apparently issued two distinct species in his L. H. 536, as *L. holomelæna, Flk.* In my copy the spores are elliptical-oblong, bilocular, and it is identical with *Biatora holomelæna,* Hepp. Eur. 12. Both MASSALONGO, and KOERBER, describe them as anguillulæform, and refer the species to *holomelæna, Flk.,* on the authority of the specimens published by SCHÆRER. I have, therefore, adopted the name *vermifera,* Nyl. for the present plant, to prevent further confusion, and on account of it being so expressive of the character of the spores. Its spermogones are not of uncommon occurrence, but they are not easily detected, on account of their diminutive size, and the dark colour of the thallus. They are punctiform, dark-brown or nearly black, sparingly scattered over the face of the thallus. The spermatia are very numerous in comparison with the minuteness of the spermogones; they are short, cylindrical, straight, ·001 in. long, by ·00025 in. broad.

GENUS 9. RAPHIOSPORA, *(Massal.)*

Apothecia open, at first concave, becoming plane, patellæform, margined by a black carbonaceous proper exciple ; thalamium submucoso-grumous, arising from a thin brownish-black simple hypothecium ; asci lax, narrow, elongato-clavate, pedicellate, each containing 6 or 8 spores; spores elongato-acicular, or subclavate, 8 to 12 locular, hyaline. Thallus crustaceous, uniform, or athalline.

1. RAPHIOSPORA FLAVO-VIRESCENS, (*Dicks.*) Thallus effuse, rather thick, verrucoso-granulated, at length leprous, bright greenish-yellow, or lemon coloured; hypothallus somewhat byssoid, or subgelatinous, dark-brown, or nearly black. Apothecia of a medium size, elevato-sessile, solitary, or congregated together into little groups ; disc very black, at first concave, afterwards plane ; margin thickish, obtuse, black ; hypothecium thin dark-brown; paraphyses hyaline, very slender, diffluent, mixed with much greenish-yellow mucoso-grumous matter; asci very lax and easily detached from the hypothecium, narrow, elongato-clavate, pedicellate, 8 spored; spores slender, elongato-acicular, or subclavate, slightly curved, 8 to 12 locular, hyaline; ·014 to ·019 in. long, by ·00075 in. broad. PLATE 3, *fig.* 70.

Lichen flavo-virescens, Dicks.—*Lichen citrinellus,* Sm. E. Bot. 1877.—*Lecidea citrinella,* Ach. Syn. 25.—Fries L. Ref. 346.—Leight. Exs. 303 !—Nyl. Enum. Gen. 127.—*L. flavo-virescens,* Hook. Brit. Fl. 2. 178.—Schær. Enum. 124, L. H. 204 ! et 532 !—*Raphiospora flavo-virescens,* Kbr. S. L. G. 268.

On the ground in sandy places on heaths, in alpine districts. Ben Lawers ! *Dr. Maingay.* Llangollen ! North Wales, *Rev. W. A. Leighton.* Co. Wicklow ! *Dr. Taylor.*

2. RAPHIOSPORA ARENICOLA, (*Nyl.*) Thallus none. Apothecia parasitic on the thallus of *Bæomyces Byssoides,* minute, elevato-sessile, numerous, solitary, scattered ; disc black, concave when young, afterwards nearly plane ; margin rather thick, obtuse, even, slightly inflexed and polished ; hypothecium very thin, brownish-black ; paraphyses hyaline, very slender, diffluent, mixed with much greenish-yellow

grumous matter; asci lax, easily detached from the hypothecium, elongato-clavate, 6 or 8 spored; spores very fragile, acicular, or subclavate, curved, flexuose, or straight, 8 to 12 locular, hyaline; ·014 to ·018 in. long, by ·00075 in. broad.

Lecidea citrinella, var. *arenicola*, Nyl. Prod. 144. (Nyl. in litt. 1859.)

Parasitic on the thallus of *Bæomyces Byssoides*. Guisbro' Moor! Lounsdale! and Ingleby Moor! Cleveland, Yorkshire. I have never met with this species otherwise than as a parasite. It differs from *flavovirescens*, by being destitute of a proper thallus, and by its scattered minute apothecia; in other respects they are similar.

GENUS 10. BILIMBIA, (*De Not.*)

Apothecia open, patellæform, margined by a very thin ceraceous proper exciple, often becoming hemispherical or globose and immarginate; thalamium arising from a grumoso-carnose simple hypothecium; asci oblongo-clavate, or clavate, 4 to 8 spored; spores fusiform, or clavato-fusiform, irregularly 4 to 8 locular, uncoloured. Thallus effuse, crustaceous, uniform.

1. BILIMBIA SPHÆROIDES, (*Sommf.*) Thallus effuse, thin, leprosogranulose, pale greenish-white. Apothecia small, often very numerous and crowded, sessile; disc subspherical, very variable in colour, pale-yellow, brown, dark-brown, or brownish-black; immarginate; hypothecium thick, subcarnose, yellowish-brown; paraphyses conglutinate; asci subclavate, 8 spored; spores fusiform, or clavato-fusiform, 4 to 8 locular, hyaline; ·004 to ·008 in. long, by 00125 in. broad.

Lecidea sphæroides, Sommf.—*Biatora vernalis*, α. et β. Fries L. Ref. 261, 263 in pt.—*Lichen viridescens*, Sm. E. Bot. 2217.—*Lecidea viridescens*, Hook. Brit. Fl. 2, 180—*L. sphæroides*, varr. *muscorum*, *vernalis, and fusca*, Schær. Enum. 140, in pt. L. H. 209!—*Biatora muscorum*, Leight. Exs. 90!—Hepp. Eur. 138!—*Bilimbia hexamera*, and *B. fusca*, Massal. Ric. 120, 121.—*B. sphæroides*, Kbr. S. L. G. 213.

β. DOLOSA, (*Ach.*) Thallus thin, effuse, leprous, greyish-white. Apothecia spherical, brown, or brownish-black. Spores as above.

Lecidea dolosa, Ach. Meth. Suppl. 11.—*L. sphæroides*, var. *dolosa*, Schær. Enum. 140, L. H. 474!—*Bilimbia tetramera*, Massal. Ric. 120. —*B. sphæroides*, var. *lignicola*, Kbr. S. L. G. 213.—*Biatora dolosa*, Hepp. Eur. 139!

On mosses, old trees, etc., in damp shady situations; common.

2. BILIMBIA ANOMALA, (*Ach.*) Thallus effuse, thin, at first subcartilaginous, smooth, becoming granuloso-verruculose, and eventually somewhat leprous, greyish-white. Apothecia small, very numerous, scattered, sessile; disc when young plane, brown, somewhat pruinose, surrounded by a thin entire margin; when old convex, naked, brownish-black, and immarginate; hypothecium pale yellowish-brown; paraphyses subconglutinate; asci short, clavate, 8 spored; spores linear-oblong, or fusiform, bi-quadrilocular, hyaline; ·003 to ·0035 in. long, by ·001 in. broad.

Lecidea anomala, Ach. Syn. 38.—Hook. Brit. Fl. 2, 182. in pt.—Schær. Enum. 138 in pt.—*Biatora anomala*, Fries L. Ref. 269 in pt.—

Lichen cyrtellus, Sm. E. Bot. 2155.—*Lecidea vernalis*, var. *anomala*, Nyl. Enum. Gen. 121.

On the trunks of trees, and occasionally on rocks, in damp shady situations; very common. The spermogones are nearly always present. They are distinctly visible to the naked eye, as minute dark-brown or black verrucæ, numerously scattered over the face of the thallus, resembling young apothecia. The spermatia are exceedingly abundant, issuing in a dense mass, short, ellipsoid, ·00075 to ·001 in. long, by ·00025 to ·0005 in. broad. These organs prove this species to be distinct from *Biatorina Griffithii*.

3. BILIMBIA MILLIARIA, (*Fries.*) Thallus effuse, granulated; granules somewhat distinct and scattered at first, afterwards more or less aggregated together and confluent, pale green when moist, greyish-white when dry; hypothallus thin, brownish-black. Apothecia minute, sessile, crowded, spherical, black; immarginate; hypothecium grumous, dull yellowish-brown; paraphyses conglutinate, pale yellowish-green, or bluish-green when viewed in masses; asci clavate, 8 spored; spores obtusely-fusiform, straight, or slightly curved, normally quadrilocular, at times 6 or 8 locular, subhyaline; ·004 to ·006 in. long, by ·001 in. broad. PLATE 3, *fig.* 71.

α. TERRESTRIS, Fries.

Lecidea milliaria, α. terrestris, Fries. L. Ref. 342.—Leight. Exs. 238! —*L. sabuletorum, α. terrestris*, Schær. Enum. 133 in pt.—*L. geomæa*, Tayl. Fl. Hib. pt. 2, 124.—*Bilimbia milliaria, α*, Kbr. S. L. G. 214.

β. SAXATILIS, (*Fries.*) Thallus granulated; granules scattered or crowded, greyish-green, or greyish-brown; eventually dissolved, forming a thin leprous crust. Apothecia as above.

Lecidea milliaria, b. *saxatilis*, Fries L. Ref. 342.—Leight. Exs. 210!

γ. LIGNARIA, (*Ach.*) Thallus thin, subleproso-granulated, greyish-green. Apothecia minute, spherical, crowded, often confluent, black; immarginate; spores fusiform, bi-quadrilocular, straight or curved, hyaline, or subhyaline, ·0025 to ·004 in. long, by ·00075 to ·001 in. broad.

Lecidea lignaria, Ach. Syn. 26.—Schær. Enum. 135 in pt. L. H. 196! —*L. milliaria*, c. Fries L. Ref. 343 in pt.—*Bilimbia lignaria*, Massal. Ric. 131, fig. 236.—*Biatora lignaria*, Hepp. Eur. 20! et 284!

δ. MELÆNA, (*Nyl.*) Thallus effuse, thin, leproso-granulose, brownish-black, or black. Apothecia minute, subspherical, black; immarginate; spores fusiform, or clavate, straight, or curved, bilocular, or quadrilocular, subhyaline; ·0025 to ·004 in. long, by ·0005 to ·001 in. broad.

Lecidea vernalis, var. *melæna*, Nyl. Enum. Gen. 121.—*Biatora milliaria*, var. *rudeta*, Fries S. V. S. 114 in pt.—*L. lignaria*, Auct. in pt.

On the ground on turfy heaths, mosses, rocks and stones, dead wood, etc.; all more or less common in alpine districts.

4. BILIMBIA SABULOSA, (*Massal.*) Thallus somewhat effuse, ruguloso-squamulose, greyish-white, or cream-coloured; squamules at first distinct and somewhat scattered, afterwards confluent, and eventually formed into a thickish rugulose crust. Apothecia of a medium size, numerous, usually congregated together into little groups; disc brownish-black, at first plane and surrounded by a very thin margin, after-

wards hemispherical and immarginate; hypothecium thick, reddish-brown; paraphyses conglutinate, yellowish-brown when viewed in masses, their apices bluish-black; asci narrow clavate, 8 spored; spores fusiform, or obtusely-fusiform, quadrilocular, subhyaline or hyaline; ·004 to ·005 in. long, by ·001 in. broad.

Bilimbia sabulosa, Massal. Ric. 132, fig. 239.—Kbr. S. L. G. 214.—*Lecidea sabuletorum,* varr. *muscorum,* and *alpestris,* Auct. in pt.—*Biatora Regeliana,* Hepp. Eur. 580!—*Lecidea vernalis,* var. *sabulosa,* Nyl. Enum. Gen. 121.

On the earth, and on mosses in alpine districts. Barmouth! North Wales, *Rev. T. Salwey.* Ben Lawers! and Castleton! Braemar, *Admiral Jones.* This differs from the preceding species, by its thallus being distinctly squamulose in its earliest stages, and by being thicker and more crustaceous afterwards; its apothecia also are larger, and the hypothecium is much thicker and of a different colour.

5. BILIMBIA TEMPLETONI, (*Tayl.*) Thallus effuse, thin, granulose; granules contiguous, or somewhat scattered, greyish-white. Apothecia of a medium size, more or less crowded, sessile; disc black, slightly polished, when young plane, and surrounded by a thin entire margin, when old conglomerate, or variously undulated, difformed, and immarginate; hypothecium thick, brownish-black; paraphyses conglutinate, rich yellowish-brown when viewed in masses; asci clavate, 8 spored; spores oblong, or obtusely-fusiform, from unilocular becoming bi-quadrilocular, subhyaline, or hyaline; ·003 to ·004 in. long, by ·001 in. broad.

Lecidea Templetoni, Tayl. Fl. Hib. pt. 2, 123.

On mosses, near Belfast! Ireland, *Mr. Templeton,* in herb. *I. Carroll, Esq.* Ben Lawers! *Admiral Jones.* This species is, I think, distinct from *milliaria.* Its principal characters are, its greyish-white granulose thallus, black and slightly polished apothecia, rich yellowish-brown thalamium, and brownish-black hypothecium.

GENUS 11. BOMBYLIOSPORA, (*De Not.*)

Apothecia patellæform, margined by a coloured, ceraceous, proper exciple, plane or hemispherical. Thalamium arising from a dark-brown, grumous, simple hypothecium; asci subclavate, one spored; spores elongato-elliptical, 8—12 annular-locular, pale yellow. Thallus crustaceous, uniform.

1. BOMBYLIOSPORA PACHYCARPA, (*Duf.*) Thallus effuse, rather thick, subtartareous, granuloso-leprous, glaucous-green when wet, creamy-yellow when dry. Apothecia large, irregularly scattered, adnate; disc plane, or slightly tumid, naked, reddish-brown, surrounded by a rather paler coloured obtuse persistent margin; asci subclavate, one spored; spores elongato-elliptical, or elongato-oblong, 8—12 annular-locular, pale yellow; ·018 to ·025 in. long, by ·007 in. broad. PLATE 3, *fig.* 72.

Lecidea pachycarpa, Duf.—Nyl. Enum. Gen. 123.—*Lichen incanus,* Sm. E. Bot. 1683.—*Lecidea incana,* Hook. Brit. Fl. 2, 181.—*Biatora pachycarpa,* Fries L. Ref. 259.—Hepp Eur. 234!—*L. incana, β. pachycarpa,* Schær. Enum. 143.—*Bombyliospora pachycarpa,* Massal. Ric. 115, fig. 226.—Kbr. S. L. G. 210.

On the trunks of decayed trees, shady rocks, etc. Authentic specimen! ex herb. *Rev. W. A. Leighton.* Cromaglawn! Killarney, *D. Moore, Esq.* The peculiar internal organization of the spores of this species, will, under all circumstances, prevent its confusion with any other British species.

GENUS 12. LOPADIUM, (*Kbr.*)

Apothecia at first nearly closed, subglobose, afterwards explanate, patellæform, margined by a subcoriaceo-ceraceous proper exciple; thalamium arising from a pale, or brownish-black grumous simple hypothecium; asci saccato-clavate, each containing one spore; spores very large, elliptical-oblong, muriform-multilocular, or filled with a coarsely granular protoplasm, yellowish-brown. Thallus crustaceous, uniform.

1. LOPADIUM PEZIZOIDEUM, (*Ach.*) Thallus thin, effuse, glebuloso-squamulose; squamules very minute, forming an uneven glebulose crust of a grey or greyish-brown colour; hypothallus subgelatinous, lurid. Apothecia of a medium size when full grown, at first turbinato-urceolate, afterwards explanate, patellæform, sessile; disc dark-brown, or nearly black, surrounded by a thick inflexed entire paler margin; paraphyses lax, pale yellowish-brown when viewed in masses; hypothecium thin, grumous, brownish-black; asci saccato-clavate, one spored; spores very large, oblong, or elliptical, muriform-multilocular, yellowish-brown; ·019 to ·022 in. long, by ·006 to ·009 in. broad.

Lecidea pezizoidea, Ach. L. Univ. 182.—Schær. Enum. 132.—Nyl. Enum. Gen. 123.—*Lopadium pezizoideum*, Kbr. S. L. G. 210.

On heaths, encrusting mosses, etc., in alpine districts. Highlands of Scotland! *Admiral Jones.* This is a well characterised species, and if the colour of its apothecia, and the form of its asci and spores are attended to, no other European species can be mistaken for it.

2. LOPADIUM FUSCO-LUTEUM, (*Dicks.*) Thallus effuse, thin, submembranaceous, granuloso-verrucose, smooth, white, or cream-coloured. Apothecia of a medium size, scattered, elevato-sessile; disc at first concave, becoming plane, dull-yellow, or reddish-brown, surrounded by a thick inflexed margin of the same colour; hypothecium pale yellow; asci oblongo-clavate, one spored; spores oblong, or elliptical-oblong, muriform-multilocular, or filled with a coarsely granular protoplasm, pale yellowish-brown; ·015 to ·021 in. long, by ·006 to ·008 in. broad. PLATE 3, *fig.* 73.

Lichen fusco-luteus, Dicks. Crypt. Fasc. 2, 18, tab. 6, f. 2.—Sm. E. Bot. 1007.—*Lecidea fusco-lutea*, Ach. Syn. 42.—Hook. Brit. Fl. 2, 183. Schær. Enum. 147.—*Parmelia ferruginea*, Fries L. Ref. 170 in pt.

On heaths, encrusting mosses, etc., in alpine districts. Authentic specimen! ex herb. *Rev. T. Salwey.* Ben Lawers! *Dr. Maingay.* Teesdale! Durham, *Rev. J. Harriman.* Highlands of Scotland! *Admiral Jones.* The spermogones are usually present on good specimens. They are minute, but distinctly visible by the aid of an ordinary lens, papillæform, smooth and somewhat shining when moist, pale brown, varying to dark-brown, seated on the smooth thallodal verrucæ. The spermatia are very abundant, ellipsoid, excessively minute, ·00016 in. long, by ·0001 in. broad. The species issued by HEPP, in his *Fl. Eur.*

404! as *Lichen fuscoluteus, Dicks.*, is not our plant, but rather a form of *Lichen ferrugineus.* I suspect that *Lecanora fuscolutea*, Nyl. Enum. Gen. 112, is also identical with the species issued by HEPP. The form of the asci and spores, will, if due attention be paid to them, in future, prevent their confusion. An examination of these organs is absolutely necessary, in order to distinguish one from the other.

GENUS 13. BIATORELLA, (*De Not.*)

Apothecia open, patellæform, margined by a ceraceous, or subcarbonaceous, proper exciple; thalamium arising from a pale yellow, or yellowish-red, subgrumous simple hypothecium; asci oblongo-clavate, 50 to 100 spored; spores very minute, elliptical, or oblong, unilocular, hyaline. Thallus crustaceous, uniform; often evanescent.

1. BIATORELLA RESINÆ, (*Fries.*) Thallus thin, effuse, leproso-granulose, pale green when wet, greyish-green when dry. Apothecia very minute, numerous, innato-sessile; disc at first plane, afterwards convex, yellowish-brown or brown; margin very thin, pale, eventually evanescent; hypothecium pale yellow; asci oblongo-clavate, 50 to 100 spored; spores very minute, elliptical-oblong, unilocular, hyaline; ·0005 to ·00075 in. long. by ·00025 to ·0005 in. broad.

Peziza resinæ, Fries. — *Lecidea resinæ*, Leight. Exs. 277!—Nyl. Enum. Gen. 122.

β. RUBICUNDULA, *Mudd.* Thallus effuse, very thin, leproso-granulose, dull greenish-grey. Apothecia minute, numerous, sessile; disc plano-convex, dark-brown when dry, reddish-brown when wet; margin very thin, soon disappearing. Spores as above.

Biatora phæostigma, Hepp. Eur. 253!

On the trunks of trees in subalpine districts. α.—On elms, Cliffrigg! near Ayton, Cleveland. β.—On the scaly bark of old larch-rails near Redcar! There is evidently an error in the specimens issued by HEPP, as *Biatora phæostigma*, Kbr. He describes the asci as being 8 spored, but in the specimen in my copy they are 50 to 100 spored, consequently I suppose the error has arisen in collecting the specimens for his *Fle. Eur.* Seeing that this plant is not identical with KOEBER's *B. phæostigma*, and having met with the same form in this district, I name it provisionally *rubicundula*, from the colour of its apothecia. It is quite distinct from the usual form of *resinæ*, but not sufficiently so to constitute a separate species. If due attention be paid to the number of spores in each ascus, no difficulty will be experienced in distinguishing these plants.

2. BIATORELLA PRUINOSA, (*Sm.*) Thallus very thin, leprous, greyish-white; often evanescent. Apothecia of a medium size, numerous, appressed; disc plane, cæsio-pruinose, or naked, reddish-black when wet, black when dry; margin thin, entire, eventually more or less undulated, rather darker coloured than the disc; hypothecium thin yellowish-brown; asci oblongo-clavate, 50 to 100 spored; spores elliptical, or oblong, unilocular, hyaline; ·00075 in. long, by ·0005 in. broad. PLATE 3, *fig.* 74.

Lichen pruinosus, Sm. E. Bot. 2244.—*Lecidea pruinosa*, Hook. Brit. Fl. 179.—Leight. Exs. 300!—*L. immersa, γ. pruinosa*, Schær. Enum. 127, L. H. 202.—*Biatorella immersa, β. pruinosa*, Massal. Ric. 132.—

Myriosperma pruinosa, Hepp. Eur. 143!—*Sarcogyne pruinosa,* Kbr. S. L. G. 267.—*Lecanora cervina,* var. *pruinosa,* Nyl. Enum. Gen. 112.

β. REGULARIS, (*Kbr.*) Apothecia rather smaller in size, adnato-sessile; disc plane or tumid, naked or pruinose, reddish-black; margin thin, even, eventually evanescent.

Sarcogyne regularis, Kbr. S. L. G. 267.

On the mortar of old walls, limestone rocks, etc., in subalpine districts. Gainford! Durham, *Rev. J. Harriman.* Corwen! North Wales, *Rev. W. A. Leighton,* Sussex Downs! *Admiral Jones.* Near Cork! *I. Carroll, Esq.* Bilsdale! Yorkshire. This is easily known from the next species by its spreading habit, very thin thallus, and reddish-black apothecia.

3. BIATORELLA MORIO, (*Ramond.*) Thallus subtartareous determinate, orbicular, areolate, yellowish or pale copper-coloured; areolæ nearly plane, somewhat shining, angular, radiato-plicate at the circumference; hypothallus thin, black. Apothecia small, innate, nearly level with the face of the areolæ; disc black, at first plane, orbicular, surrounded by a thin black margin, afterwards angular and somewhat gyroso-plicate; hypothecium thin, grumous, yellowish-brown; paraphyses lax; asci oblongo-clavate, 50 to 100 spored; spores very minute, globose, or elliptical, unilocular, hyaline; ·00075 in. long, by ·00025 to ·0005 in. broad.

Lichen Morio, Ramond D.C. Fl. Fr. 2, 366.—*Lecidea Morio,* Fries L. Ref. 319.—*L. cechumena,* γ. *testudinea,* Ach. L. Univ. 158.—*L. Morio,* α. Schær. Enum. 108, L. H. 227! *Biatorella testudinea,* Massal. Ric. 131, fig. 258.—*Sporastatia Morio,* Kbr. S. L. G. 265.

β. CINEREA, (*Schær.*) Thallus rimoso-areolate, greyish-brown; areolæ more or less crowded in the centre, subeffigurate at the circumference. Apothecia of a medium size. Otherwise as above.

Lecidea Morio, β. *cinerea,* Schær. Enum. 108.—*B. fuscoatra,* Leight. Exs. 304!—*Sporastatia Morio,* β. Kbr. S. L. G. 265.

On granite and whinstone rocks in alpine districts. Barmouth! North Wales, *Rev. W. A. Leighton.* Yorkshire! *I. G. Baker, Esq.* The habit and general appearance of this plant are very similar to those of *Lecidea fumosa,* and unless the spores are examined, it may be passed over as a state of that species.

GENUS 14. PYRRHOSPORA, (*Kbr.*)

Apothecia open from the first, pseudopatellæform or submaculæform, immarginate; thalamium arising from a yellowish carnose, simple hypothecium; asci subclavate, 8 spored; spores oblong, or subglobose, unilocular, reddish-brown, becoming pale yellow. Thallus crustaceous, uniform.

This genus is distinguished from *Lecidea,* by the form of the apothecia, and colour of the spores.

1. PYRRHOSPORA QUERNEA, (*Dicks.*) Thallus effuse, variable in thickness, granuloso-pulverulent, greenish, or pale brownish-yellow. Apothecia small, not very numerous, scattered, somewhat immersed in the pulverulent thallus when young, afterwards sessile; disc plano-convex, reddish-brown, or dark-red, immarginate; asci subclavate,

8 spored; spores oblong, or subglobose, unilocular, reddish-brown, or pale yellow; ·0025 in. long, by ·00125 to ·0015 in. broad. PLATE 3, *fig.* 75.

Lichen querneus, Dicks. Crypt. Fasc. 1, 9, t. 2, f. 3.—Sm. E. Bot. 485.—*Lecidea quernea*, Ach. Syn. 36.—Hook. Brit. Fl. 2, 180.—Schær. Enum, 141, L. H. 582!—*Biatora quernea*, Fries. L. Ref. 279.—Leight. Ex. 61!—Massal. Ric. 126, fig. 248.—*Pyrrhospora quernea*, Kbr. S. L. G. 209.

On the trunks of old trees, especially oak and alder, in subalpine districts; common. This species is easily known by its yellow pulverulent thallus, and by the form of its apothecia, and colour of its spores.

GENUS 15. LECIDEA, (*Ach.*)

Apothecia open from the first, normally patellæform, margined by a carnose, ceraceous, or carbonaceous, proper exciple; thalamium arising from a pale carnoso-grumous, or brownish-black carbonaceous, simple hypothecium; asci clavate, each containing 8 spores; spores elliptical or elliptical-oblong, unilocular, uncoloured. Thallus crustaceous, uniform; hypothallus various.

I see no permanent and definite characteristic distinction between the genus *Biatora* and *Lecidea* as constituted by FRIES, nor between *Biatora*, *Lecidella*, and *Lecidea* by KOERBER. The colour of the apothecia in many instances furnishes a prominent specific character, but it is too variable and too liable to be changed by atmospheric influence to be admitted as a generic guide. The degree of solidity or compactness of the hypothecia and their different shades of colour are also too fine and delicate points for generic purposes in the present tribe. The genus *Lecidea* as here defined, is distinguished, essentially by the form and colour of the spores.

SECT. 1.—*Apothecia coloured, never truly black from the first; hypothecium pale carnose or grumous.*

1. LECIDEA LUCIDA, (*Ach.*) Thallus effuse, thin, leproso-pulverulent, greenish-yellow, or sulphur coloured. Apothecia minute, sparingly produced, scattered; disc plano-convex, pale lemon-yellow; margin thin, obscure; asci very minute, subulate, 8 spored; spores elliptical, or ovate, unilocular, hyaline; ·0015 in. long, by ·0005 in. broad.

Lichen lucidus, Ach. Prod.—Sm. E. Bot. 1550.—*Lecidea lucida*, Ach. Syn. 48.—Hook. Brit. Fl. 2, 185.—Schær. Enum. 150, L. H. 225! *Biatora lucida*, Fries L. Ref. 279.—Massal. Ric. 126, fig. 249.—Kbr. S. L. G. 208.

On sandstone rocks and walls in subalpine districts; common. The apothecia, in a perfect state, are not of frequent occurrence; but the species is easily known by its yellow pulverulent thallus. The *Rev. W. A. Leighton* seems inclined to regard the thallus as belonging to *Coniocybe citrina*, and the apothecia as its spermogones. (See his remarks in the *Ann. & Mag. Nat. Hist.* for Feb. 1857.) I regard them as distinct species. The apothecia and spores are as described above; what its spermogones may be, I cannot say, never having met with them.

2. LECIDEA RUPESTRIS, (*Scop.*) Thallus effuse, thin, leproso-granu-

lose, greyish-white. Apothecia of a medium size, numerous, prominent; disc when young plane, afterwards hemispherical, dull orange-coloured, or tawny-red; immarginate; asci clavate, 8 spored; spores elliptical, or elliptical-oblong, unilocular, hyaline; ·0025 to ·003 in. long, by ·001 to ·00125 in. broad.

Lichen rupestris, Scop.—*Lichen calvus*, Dicks.—Sm. E. Bot. 948.—*Lecidea rupestris*, Hook. Brit. Fl. 2, 183.—*Parmelia aurantiaca*, γ. *calva*, Fries L. Ref. 167.—*L. rupestris*, β. Schær. Enum. 146, L. H. 221!—*Biatora rupestris*, β. et γ. Hepp. Eur. 7! 134!—Kbr. S. L. G. 207 in pt.

β. INCRUSTANS, (*D.C.*) Thallus white, tartareous. Apothecia small, immersed, plane, or slightly convex, yellowish orange-coloured.

Patellaria incrustans, D.C.—*Lecidea rupestris*, α. *incrustans*, Schær. Enum. 146, L. H. 220!—*Biatora rupestris*, α. *Hepp. Eur.* 274.

γ. VIRIDIFLAVESCENS, (*Wulf.*) Thallus white, tartareo-glebulose. Apothecia small, numerous, subinnate, yellowish, or orange-coloured, immarginate.

Lichen viridiflavescens, Wulf.—*Lecidea rupestris*, var. *viridiflavescens*, Schær. Enum. 146.—*Biatora rupestris*, var. Hepp. Eur. 275!—*B. aurantiaca*, var. *flavovirescens*, Leight. Exs. 119!

On calcareous rocks, walls, etc.; very common in limestone districts. The colour of the apothecia varies from yellowish-orange, to dark-brown, according to the degree of light or shade.

3. LECIDEA CONGLOMERATA, (*Hedy.*) Thallus effuse, thin, leproso-granulose, pale green when wet, greyish-green when dry. Apothecia minute, very numerous, solitary or conglomerate; disc convex, pale brown, becoming reddish-brown; immarginate; asci clavate, 8 spored; spores narrow oblong, unilocular, hyaline; ·003 in. long, by ·00075 in. broad.

Lichen conglomeratus, Hedy.—*Biatora vernalis*, b. *conglomerata*, Fries L. Ref. 261 in pt.—*L. sphæroides*, γ. Schær. Enum. 140, L. H. 207!—*B. conglomerata*, Massal. Ric. 123, fig. 240.—Kbr. S. L. G. 204. —*B. vernalis*, var. *conglomerata*, Leight. Exs. 151!

On the trunks of trees in shady woods. On alders near Thirsk! Yorkshire, *I. G. Baker, Esq.* Airyholme Wood! Cleveland. This species is allied to *Biatorina sphæroides* in its habit and general external appearance. It is distinguished by its minute immarginate brown apothecia, and unilocular spores. The spermogones are occasionally present. They are difficult to distinguish from the thallodal granules, as they are nearly of the same colour and usually immersed in their substance. The spermatia are very numerous, issuing in a dense cloud, cylindrico-acicular, curved, ·0025 in. long, ·00025 in. broad.

4. LECIDEA OCHROCOCCA, *Nyl.* Thallus effuse, thin, granuloso-verruculose, smooth, livid or reddish-brown. Apothecia minute, scattered, sessile; disc plane, reddish, or rusty-brown, surrounded by a thin, rather paler coloured margin; eventually convex, the margin more or less evanescent; hypothecium carnose, pale; paraphyses conglutinate, yellowish-brown when viewed in masses; asci obscure, clavate; spores minute, oblong, unilocular, hyaline; ·0015 to ·002 in. long, by ·0005 in. broad.

Lecidea ochrococca, Nyl. M. S.

On the scaly bark of Scotch-firs. Ireland! *Admiral Jones.* This species somewhat resembles *Lecanora varia,* especially in the mode of expansion of its thallus, but differs from it in colour. The name *ochrococca,* given it by NYLANDER, is exceedingly expressive, as it conveys to the mind, at once, a clear idea of the real colour of both its thallus and apothecia.

5. LECIDEA EFFUSA, (*Ach.*) Thallus effuse, thinnish, granuloso-pulverulent, dark green when wet, light green when dry, changing to greenish-brown in the herbarium. Apothecia minute, usually very numerous, scattered, sessile; disc at first plane, pale waxy-brown, surrounded by a very thin even margin, afterwards convex, dark-brown, and immarginate; asci subclavate, 8 spored; spores elliptical-oblong, unilocular, hyaline; ·002 in. long, by ·00075 in. broad.

Lichen effusus, Ach. Prod.—Sm. E. Bot. 1863, 3 upper fig.—*Lecidea anomala, β.* Hook. Brit. Fl. 2, 182.—*Biatora effusa,* Massal. Ric. 127.

On the trunks of trees, but generally near the ground; common in shady woods in subalpine or mountainous districts. Readily known by its green pulverulent thallus, pale waxy-brown apothecia, and its minute unilocular spores.

6. LECIDEA MINUTA, (*Schær.*) Thallus effuse, thin, at first subcartilaginous, smooth, at length rimulose and eventually leprous, white, or cream-coloured. Apothecia minute, numerous, scattered, adnate; disc when young, plane, brown, surrounded by a very thin smooth margin, when old, reddish or nearly black, tumid or convex, and immarginate; hypothecium thickish, yellowish-brown; paraphyses conglutinate; asci clavate, 8 spored; spores elliptical, or oblong, unilocular, hyaline; ·0025 to ·003 in. long, by ·00075 in. broad.

Lecidea anomala, var. *minuta,* Schær. Enum. 139, L. H. 211!—*L. minuta,* Massal. Ric. 76, fig. 151.—*B. minuta,* Kbr. S. L. G. 200.—*L. anomala,* var. *minuta,* Leight. Exs. 298! and 326!

On the trunks of trees, especially ash, in damp shady woods. Airyholme Wood! and Hoggarts Wood! Ingleby, Cleveland. This species must not be confounded with *Bilimbia anomala,* which grows in similar localities, and which very closely resembles it in its external appearance. Its small reddish-brown or nearly black apothecia, and its minute unilocular spores are its distinguishing characters.

7. LECIDEA MUTABILIS, (*Fee.*) Thallus subdeterminate, thin, membranaceous, contiguous, smooth, glaucous-white; hypothallus thin, bluish-black, surrounding the thallus at its circumference in the form of a narrow serpentine line. Apothecia minute, scattered, sessile; disc plane, reddish-brown, surrounded by a thin smooth margin; hypothecium thin, pale yellowish-brown; paraphyses conglutinate; asci ovate, or subpyriform, very conspicuous, 8 spored; spores large, ellipitical, or ovate, unilocular, hyaline; ·003 to ·004 in. long. by ·002 in. broad.

Lecidea mutabilis, Fee.—Nyl. Enum. Gen. 120.—Carroll in Nat. Hist. Rev. vol. 6, No. 4.

On the smooth bark of young trees. Castlebernard Park! and near Blackwater Bridge! Ireland, *I. Carroll, Esq.* This is a very distinct species, but care must be taken not to confound it with states of *minuta.*

Its short ovate or subpyriform asci, and large spores are characters, which, if due attention be paid to them, will prevent their confusion. The spermogones are apparently not uncommon, They are very minute, punctiform, slightly prominent, dark-brown, sparingly scattered over the whole surface of the thallus. The spermatia are not very numerous; they are acicular, more or less curved, ·005 in. long, by ·0002 in. broad.

8. Lecidea prasina, (*Fries.*) Thallus effuse, thickish, mucoso-gelatinous when wet, leprose when dry, and eventually pulverulent, dull-green, changing to yellowish-green. Apothecia minute, solitary and scattered, or congregated together into little groups; disc hemispherical or subglobose, from pale flesh-colour becoming livid-brown or nearly black; immarginate; hypothecium carnoso-grumous, yellow, or yellowish-brown; paraphyses conglutinate; asci clavate, 8 spored; spores oblong, or ovate, unilocular, subhyaline, or hyaline; ·002 to ·0025 in. long, by ·001 in. broad.

Micarea prasina, Fries Syst. O. V. 257, and *Biatora vernalis*, var. L. Ref. 262,—*Lecidea prasina*, Schær. Enum. 137.—*Micarea prasina*, Kbr. S. L. G. 399.—*L. vernalis*, var. Nyl. Enum. Gen. 121.—*B. prasina*, Hepp. Eur. 278!

On old decayed trees in shady woods. Stanstead Park! Essex, *Mr. R. Jacob*. Hoggarts Wood! Ingleby, Cleveland.

9. Lecidea viridescens, (*Shrad.*) Thallus effuse, thin, granulose, becoming pulverulent, greenish-yellow. Apothecia minute, sessile, solitary, or confluent and grouped; disc more or less convex, livid, or livid-black, subimmarginate; hypothecium pale yellowish-brown; paraphyses rather lax; asci narrow clavate, 8 spored; spores oblong, or ovate, unilocular, hyaline; ·0025 in. long, by ·001 in. broad.

Lichen viridescens, Schrad.—*Lecidea sphæroides*, var. *viridescens*, Schær. Enum. 140, L. H. 208!—*L. viridescens*, Massal. Ric. 64, fig. 118.—Nyl. Enum. Gen. 121.—*Biatora viridescens*, *β. putrida*, Kbr. S. L. G. 201.

β. gelatinosa, (*Flk.*) Thallus effuse, leproso-gelatinous, greyish-green when wet, greyish-brown when dry. Apothecia of a medium size, appressed, scattered; disc plane and even when young, livid, surrounded by a thin margin, afterwards black, difformed, and immarginate. Spores as above.

Lecidea gelatinosa, Hook.—Schær. Enum. 137, L. H. 205!—Massal. Ric. 64, fig. 119.—*Biatora viridescens*, *α. gelatinosa*, Kbr. S. L. G. 201.

On old decayed stumps, and on the ground in subalpine districts. Kelley's Glen! near Dublin, *D. Moore, Esq.* Guisbro' Moor, Cleveland, Yorkshire. These forms may be known by their livid or livid-black apothecia, rather loose paraphyses, and by their conspicuous, narrow clavate asci.

10. Lecidea flexuosa, (*Fries.*) Thallus effuse, thin, granulated, or areolato-verrucose, greyish-green. Apothecia minute, numerous, scattered, sessile; disc constantly plane, reddish-black or livid, surrounded by a thin even, or flexuose margin; hypothecium pale yellowish-brown; asci narrow oblongo-clavate, 8 spored; spores oblong, unilocular,

hyaline; ·0015 to ·002 in. long, by ·0005 to ·00075 in. broad.

Biatora decolorans, β. flexuosa, Fries L. Ref. 268.—*Lecidea granulosa, β.* Schær. Enum, 138.—*L. flexuosa,* Nyl. Enum. Gen. 121. L. P. 53!—*Biatora flexuosa,* Kbr. S. L. G. 194.

β. ÆRUGINOSA, (*Borr.*) Thallus effuse, granulated, becoming leproso-pulverulent, greenish-yellow. Apothecia minute; disc plane, or tumid, reddish-brown, changing to reddish-black. Otherwise as above.

Lecidea æruginosa, Borr. in E. Bot. Suppl. 2682.—Hook. Brit. Fl. 2, 181.

On old dead, or decaying trees, especially Scotch firs, in mountainous districts. Lounsdale! and Kildale! Cleveland. These forms may be readily recognized by the green colour of their thalli, their small reddish-black apothecia, and their minute spores. The spermogones are occasionally present. They are very minute, numerous, punctiform, prominent, solitary, livid, or nearly black, scattered over the whole face of the thallus. The spermatia are very slender and delicate, cylindrical, straight, ·001 in. long, by ·0001 in. broad.

11. LECIDEA DECOLORANS, (*Hoffm.*) Thallus effuse, subtartareous, leproso-granulose, greyish-white. Apothecia of a medium size, solitary and scattered, or somewhat confluent and grouped, appressed; disc plane or tumid, varying in colour from light brown to brownish-black; margin thin, pale, entire when young, afterwards flexuose, and eventually evanescent; hypothecium pale greenish-yellow; asci oblongo-clavate, 8 spored; spores elliptical, or oblong, filled with a finely granular protoplasm, subhyaline; ·003 to ·0035 in. long, by ·00125 in. broad.

Patellaria decolorans, Hoffm.—*Lichen quadricolor,* Dicks.—Sm. E. Bot. 1185.—*Lecidea quadricolor,* Hook. Brit. Fl. 2, 182.—*Biatora decolorans,* Fries L. Ref. 266.—Leight. Exs. 59!—Kbr. S. L. G. 193.—*L. granulosa,* Schær. Enum. 137, L. H. 213!—*B. decolorans,* and *B. granulosa,* Massal. Ric. 123, 124.—*L. decolorans,* Nyl. Enum. Gen. 121.

β. ESCHAROIDES, (*Ehrh.*) Thallus granuloso-verrucose, greyish-white. Apothecia more or less confluent and irregular, rugose, convex, subimmarginate, brownish-black.

Lichen escharoides, Ehrh.—*Biatora decolorans,* b. Fries L. Ref. 267. *Lecidea granulosa,* b. Schær. Enum. 137, L. H. 214!

γ. VIRIDULA. Thallus effuse, granuloso-leprous, dark-green when moist, greyish-green when dry; granules eventually dissolved, pulverulent, yellow. Apothecia solitary or confluent; disc plane or tumid, externally reddish-black when wet, black when dry; hypothecium rather thick, greenish-yellow; paraphyses conglutinate, concolorous with the hypothecium when viewed in masses.

On the ground, on heaths in alpine districts; frequent. The colour of the apothecia of this species is extremely variable, and is much affected by atmospheric influences, indeed so much so, that, unless they are dissected, they will cause those who are not well acquainted with it some trouble in recognising the different forms.

12. LECIDEA ULIGINOSA, (*Schrad.*) Thallus leproso-granulose, often subgelatinous when growing, olive-brown, or brownish-black; hypothallus thin, black, often confused with the thallus. Apothecia minute, solitary and scattered, or confluent and grouped; disc plane, becoming

hemispherical, dark-brown when wet, brownish-black when dry; margin thin, entire, eventually evanescent; hypothecium yellowish or reddish-brown; asci oblongo-clavate, 8 spored; spores oblong, or elliptical, unilocular, subhyaline, or hyaline; ·003 in. long, by ·00125 in. broad.

Lichen uliginosus, Schrad.—Sm. E. Bot. 1466.—*Lecidea uliginosa*, Ach. Syn. 25.—Hook. Brit. Fl. 2, 179.—Schær. Enum. 136, L. H. 162! et 163!—Nyl. Enum. Gen. 121.—*Biatora uliginosa*, Fries L. Ref. 275. Leight. Exs. 120!—Massal. Ric. 129.—Hepp. Eur. 132!—Kbr. S. L. G. 197.

β. FULIGINEA, (*Ach.*) Thallus effuse, granulose; granules minute, crowded, forming a subcoralline crust of a rusty-brown colour; hypothallus thin, brownish-black. Apothecia small, sessile, solitary, or confluent; disc at first plane, reddish-brown, or of the same colour as the thallus, and surrounded by a thin entire margin, afterwards convex, dark-brown and immarginate. Otherwise as above.

Lecidea fuliginea, Ach. Syn. 35.—Schær. Enum. 136.—*Biatora uliginosa*, var. *fulginea*, Fries L. Ref. 275.—Kbr. S. L. G. 197.—*Biatora fulginea*, Hepp. Eur. 267!

On the ground, on turfy or sandy heaths in mountainous districts. α.—Very common. β.—On old dead trees, decayed stumps, etc. Sussex! *Admiral Jones.* Bilsdale! Yorkshire. Kildale! and near Ayton! Cleveland.

13. LECIDEA ATRO-FUSCA, (*Fw.*) Thallus thin, indeterminate, leproso-granulose, greyish-white. Apothecia of a medium size, adnate, solitary and scattered, or congregated together into little groups, not confluent; disc when young concave, becoming plane, varying in colour from yellowish-brown to reddish-black, surrounded by a thin entire margin; when old convex and immarginate; hypothecium rather thick, yellowish-brown, more or less tinged with red; asci subclavate, 8 spored; spores elliptical, or linear-oblong, unilocular, subhyaline, or hyaline; ·0025 to ·004 in. long, by ·001 in. broad.

Biatora vernalis, var. *atrofusca*, Fw.—*Lecidea sabuletorum*, var. *alpestris*, Schær. Enum, 134 in pt.—*Biatora vernalis*, Kbr. S. L. G. 202.—*B. atro-fusca*, Hepp. Eur. 268!

On the ground, over-running mosses, etc., in alpine districts. Ireland! ex herb. *I. Carroll, Esq.* Barmouth! North Wales, *Rev. T. Salwey.* Limestone Ridge, Castleton! Braemar, *Admiral Jones.* The densely crowded brown or reddish-black apothecia, reddish-brown hypothecium, and the elongated spores, are the principal characters by which this species is known.

14. LECIDEA SANGUINEO-ATRA, (*Fries.*) Thallus effuse, rather thick, granuloso-verruculose, becoming more or less leproso-pulverulent, green when wet and growing, greyish-green when dry. Apothecia of a medium size, sessile, often densely crowded together; disc when young reddish-brown, plane, and surrounded by a smooth margin, when fully developed convex, reddish-black, and immarginate; hypothecium thick, dark-red; paraphyses conglutinate, rich yellowish-brown when viewed in masses; asci narrow clavate, 8 spored; spores elliptical, or oblong, unilocular, hyaline; ·0025 to ·003 in. long by ·001 in. broad.

Biatora vernalis, β. *sanguineo-atra*, Fries L. Ref. 263 in pt.—*Lecidea sphæroides*, var. *fusca*, Schær. Enum. 140 in pt.—*Lecidea sanguineo-atra*, Nyl. Enum. Gen. 121, L. P. 52!

On the trunks of old trees, generally near the ground. Broughton Bank! and Hoggarts Wood! Ingleby, Cleveland. Two species are apparently included under *sanguineo-atra*, viz., *B. fusca*, Hepp. Eur. 11! and the one just described. Hepp's plant has bilocular spores, and is quite distinct from that issued by Nylander as *sanguineo-atra* of Fries. My specimens agree with Nylander's.

15. LECIDEA TAYLORI, (*Salw.*) Thallus effuse, thickish, tartareous, rimuloso-areolate, and occasionally minutely verruculose, smooth, cream-coloured, or pale brown. Apothecia of a medium size, numerous, scattered, subelevato-sessile; disc plane, when young pale brown, surrounded by a thin entire margin, afterwards dark-brown, subimmarginate and often difformed; hypothecium pale yellowish-brown; paraphyses subconglutinate; asci clavate, 8 spored; spores elliptical-oblong, unilocular, subhyaline, ·0025 to ·003 in. long, by ·001 in. broad.

Biatora Taylori, Salwey, Obs. on Penz. Lich. 144, Oct. 31st., 1853. —*Bæomyces anomalus*, Tayl. Fl. Hib. pt. 2, 79.—Leight. Exs. 283!—*Lecidea lævigata*, Nyl.

On rocks and stones in mountainous districts. Barmouth! *Rev. T. Salwey.* Blackwater Bridge! Co. Kerry, *I. Carroll, Esq.* Ilfracombe! *Miss M. Atwood.* This is a very distinct species, and also one that may be easily recognized. Its spermogones are present on the specimens from Blackwater Bridge. They are visible to the eye as minute black points, numerously scattered about the circumference of the thallus, and are quite immersed in its substance, their apices alone being visible. The spermatia are cylindrical, very fine and delicate, elegantly curved, or undulated; ·004 to ·005 in. long, by ·00012 in. broad.

16. LECIDEA RIVULOSA, (*Ach.*) Thallus tartareous, rimoso-areolate, dark-brown, or brownish-grey; often limited and intersected by the hypothallus, which is brownish-black. Apothecia of a medium size, numerous, scattered, sessile; disc plane, brown, or reddish-black, surrounded by a thin flexuose paler coloured margin; hypothecium pale yellowish-brown; asci subclavate, 8 spored; spores oblong, often slightly curved, unilocular, or faintly bilocular, hyaline; ·0025 in. long, by ·001 in. broad.

Lecidea rivulosa, Ach. Meth. 38.—Hook. Brit. Fl. 2, 179. Nyl. Enum. Gen. 125, L. P. 59!—Schær. Enum. 111.—*Biatora rivulosa*, Fries. L. Ref. 271.—Massal. Ric. 125.—Kbr. S. L. G. 196.

β. KOCHIANA, (*Hepp.*) Thallus effuse, smooth, pale brown, or cream-coloured. Apothecia subinnate; disc plane, brownish-black, surrounded by a paler coloured margin, which eventually disappears.

Lecidea Kochiana, Hepp. Wurz. Lich. Fl. 61. *Biatora.* Fl. Eur. 239!—*Biatora rivulosa*, var. *Kochiana*, Fries L. Ref. 272.—Massal. Ric. 125.—Kbr. S. L. G. 196.—Leight. Exs. 302!—*Lecidea.* Schær. Enum. 111, L. H. 181!

On rocks and stones in mountainous districts; frequent. Its spermogones are usually present. They are indiscriminately scattered over the surface of the thallus, visible to the eye, verrucæform, solitary, or confluent and grouped, dark-brown. The spermatia are very abundant, minute, ellipsoid, ·0005 in. long, by ·0002 in. broad.

SECT. 2.—*Apothecia reddish-black, or black; hypothecium carnoso-grumous, never carbonaceous.*

17. Lecidea Wulfenii, (*Hepp.*) Thallus effuse, thinnish, tartareous, granuloso-leprose, white, or greyish white. Apothecia of a medium size, numerous, often crowded, sessile; disc when young plane, black, naked, surrounded by a thin entire margin, when mature convex and immarginate; hypothecium thickish, grumous, yellowish-brown; paraphyses rather lax; asci narrow clavate, 8 spored; spores elliptical-oblong, or oblong, unilocular, subhyaline, or hyaline; ·003 to ·0035 in. long, by ·001 to ·00125 in. broad.

Biatora Wulfenii, Hepp. Eur. 5!—*Lecidea subuletorum*, var. *alpestris*, Fries L. Ref. 339 in pt.—*L. sabluteorum*, var. *muscorum*, Schær. Enum. 133, L. H. 194! in pt.—*Lecidella Laureri*, β. Kbr. L. G. 246.

On mosses, etc., in alpine districts. Summit of Ben Macdhui! *Dr. Lindsay.* Ben Lawers! *Dr. Maingay.* Cave Hill! Belfast, *Professor Dickie.* This may be known from the next species, by its white tartareous thallus, and its naked black apothecia.

18. Lecidea arctica, (*Sommf.*) Thallus cartilagineo-tartareous, granulated, brownish-grey; granules distinct, papillæform, or confluent. Apothecia of a medium size, scattered among the thallodal granules; disc convex, black, cæsio-pruinose, subimmarginate; hypothecium subcarnose, yellowish-brown; paraphyses conglutinate, rich bluish-green when viewed in masses; asci clavate, 8 spored; spores elliptical-oblong, unilocular, hyaline; ·003 to ·004 in. long, by ·001 to ·0015 in. broad.

Lecidea arctica, Sommerf.—Fries L. Ref. 342.—Schær. Enum. 135.—Nyl. Enum. Gen. 124.—*Lecidella arctica*, Kbr. S. L. G. 243.

On mosses, etc., in alpine districts. Ben Lawers! *Admiral Jones*, and *Dr. Lindsay.* The present species is distinguished, essentially from the foregoing, by the colour and form of its thallus, cæsio-pruinose apothecia, and by the colour of its paraphyses.

19. Lecidea parasema, (*Ach.*) Thallus subdeterminate, thin, subcartilaginous, at first smooth, afterwards somewhat granulated, grey, or greenish-yellow; hypothallus black, surrounding the thallus at its circumference in the form of a narrow undulated line. Apothecia small, numerous, scattered; disc livid-black, or black, plane when young and surrounded by a thin smooth margin, at length tumid and subimmarginate; hypothecium thickish, yellowish-brown; paraphyses lax; asci numerous, conspicuous, clavate, 8 spored; spores broadly elliptical, or ovate, each often containing one or two oily globules, subhyaline or hyaline; ·0025 to ·003 in. long, by ·0015 to ·00175 in. broad.

Lichen parasemus, Ach. Prod.—Sm. E. Bot. 1450 in pt.—*Lecidea parasema*, Ach. Syn. 17 in pt.—Hook. Brit. Fl. 2, 176 in pt.—Fries L. Ref. 330, and *L. enteroleuca*, 331 in pt.—Nyl. Enum. Gen. 124.—*L. enteroleuca*, Schær. Enum. 128, L. H. 530!—*Biatora olivacea*, Hepp. Eur. 3! and *B. enteroleuca*, Hepp. Eur. 127! 249! 250!—*L. parasema*, Leight. Exs. 327! 328!—*Lecidella enteroleuca*, Kbr. S. L. G. 243 in pt.

β. elæochroma, (*Ach.*) Thallus macular, thinnish, rimulose, becoming granuloso-leprous; rugose, greenish-yellow, or yellow. Apothecia numerous, central, often crowded and somewhat confluent; disc livid-black, or black, plane when young, surrounded by a thin smooth margin, afterwards convex, rugose, and immarginate.

Lecidea elæochoma, Ach. Syn. 18.—*L. enteroleuca*, var. *olivacea*, Fries L. Ref. 331.—*Lichen parasemus*, Sm. E. Bot. 1450 in pt.—*L. punctata*, var. *rugulosa*, Schær. Enum. 129, L. H. 528!—*L. elæochroma*, Leight. Exs. 126! *L. parasema*, 329! and *L. scabrosa*, 332! idem,—*Biatora enteroleuca*, var. *rugulosa*, Hepp. Eur. 128!

γ. ENTEROLEUCA, (*Ach.*) Thallus thinnish, at first contiguous, becoming rimuloso-granulose and eventually pulverulent, glaucous, or greenish-white. Apothecia scattered, or crowded and grouped; disc black, plane when young, afterwards tumid, subimmarginate.

Lecidea enteroleuca, Ach. Syn. 19.—Fries L. Ref. 331 in pt.—Schær. Enum. 128 in pt.—*Biatora olivacea*, var. *elæochroma*, Hepp. Eur. 247! and 248!

δ. SAXICOLA, (*Leight.*) Thallus thinnish, rimuloso-granulose, greyish-green or grey. Apothecia of a medium size, numerous, scattered; disc plane, reddish-black, or black, surrounded by a thin smooth margin, afterwards tumid and subimmarginate.

Lecidea parasema, var. *enteroleuca*, *saxicola*, Leight. Exs. 330!—Nyl. L. P. 57!

On the trunks of trees, old pales, and occasionally on rocks; very common. The varieties here enumerated frequently pass from one to another, and are often scarcely distinguishable. Their spermogones are usually present. They are minute, numerously scattered over the face of the thallus, punctiform, semi-immersed, dark-brown, or black. The spermatia are abundant, often issuing in a long continued stream, cylindrical, elegantly curved, or undulated, ·0035 to ·004 in. long, by ·00012 in. broad.

20. LECIDEA TURGIDULA, (*Fries.*) Thallus effuse, thin, leprous, glaucous, or greyish-white; often evanescent. Apothecia small, scattered, solitary, or confluent, subinnato-sessile; disc black, plane, or convex, immarginate; hypothecium yellowish-brown; paraphyses conglutinate, their apices black; asci small, clavate, 8 spored; spores elliptical, unilocular, hyaline; ·0015 to ·002 in. long, by ·0005 to ·00075 in. broad.

Lecidea turgidula, Fries L. Ref. 337.—*L. turgidula*, and *L. punctata*, var. *denudata*, Schær. Enum. 130, L. H. 529! and 196! in pt.—*L. denudata*, Massal. Ric. 65, fig. 120.—*Lecidella turgidula*, Kbr. S. L. G. 243.—*Biatora turgidula*, and *B. alba*, Hepp. Eur. 251! 269!

On the scaly bark of Scotch firs, dead wood, etc., in mountainous districts. Baysdale! Cleveland, Yorkshire. This is easily known by its small turgid and immarginate apothecia. Its thallus is often altogether absent.

21. LECIDEA CONIOPS, (*Wahlb.*) Thallus subtartareous, granulose, greyish-white; granules scattered, or crowded, forming a rimuloso-areolate crust. Apothecia small, numerous, subinnate, or sessile; disc black, plane when young, surrounded by a thin, entire margin, at length convex and subimmarginate; hypothecium thickish, grumous, yellowish-brown; paraphyses rather lax, pale, their apices bluish-black; asci numerous, conspicuous, clavate, 8 spored; spores elliptical-oblong, unilocular; at times each spore contains one or two oily globules; hyaline; ·0025 to ·003 in. long, by ·00125 to ·00175 in. broad.

Lecidea coniops, Wahlenb.—Ach. Meth. Suppl. 8.—*L. sabuletorum*, var. *coniops*, Fries L. Ref. 340.—Leight. Exs. 331!—Schær. Enum. 133, L. H. 193!—Massal. Ric. 65.—*Biatora sabuletorum*, var. *coniops*, Hepp. Eur. 133!—*Lecidella sabuletorum*, Kbr. S. L. G. 234.

β. AEQUATA, (*Flk.*) Thallus thin, subtartareous, rimuloso-areolate, smooth and even, greyish-white. Apothecia minute, numerous, scattered. Otherwise as above.

Lecidea sabuletorum, var. *aequata*, Flk. in Schær. Enum. 133, L. H. 656!—*Biatora sabuletorum*, var. *aequata*, Hepp. Eur. 6!

On rocks in moist shady situations in alpine, or mountainous districts. Lyth Hill! Shropshire, *Rev. W. A. Leighton.* Brandon Mountain! *I. Carroll, Esq.* Ben Lawers! and in the Co. of Down! Ireland, *Admiral Jones.* The spermogones are apparently of frequent occurrence. They are minute, punctiform, slightly prominent, black, numerously scattered over the whole surface of the thallus. The spermatia are cylindrical, variously curved and undulated, ·005 to ·006 in. long, by ·00012 in. broad.

22. LECIDEA LUTOSA, (*Montagne.*) Thallus thin, subtartareous, rimuloso-areolate, rust-coloured or yellowish-brown. Apothecia small, not very numerous, scattered, subinnato-sessile; disc reddish-black, or black, plane, surrounded by a thin entire margin, at length tumid and immarginate; hypothecium thin, pale yellow; paraphyses rather lax, pale, their apices brownish-black; asci conspicuous, clavato-ventricose, 8 spored; spores elliptical-oblong, unilocular, or pseudo-bilocular, subhyaline, or hyaline: ·0025 to ·0035 in. long, by ·0015 to ·00175 in. broad.

Lecidea lutosa, Mont. Schær. Enum. 116, L. H. 579!—*Catillaria lutosa*, Massal. Ric. 79, fig. 159.—*Biatora ochracea*, Hepp. Eur. 263!

On rocks in alpine districts. One specimen in herb, *I. G. Baker, Esq.* MASSALONGO figures the spores as bilocular, but they are not truly so. The internal substance appears to me to collapse from the centre of each spore and to fall gradually towards the extremities, leaving an empty space in the middle, and there finally assuming the form of a rounded globule; and hence their bilocular aspect. This, however, is not a constant character, as the content ssometimes collapse into only one globule, and at other times into three. NYLANDER, apparently regards this species as a variety of *L. parasema*, I believe they are truly distinct.

23. LECIDEA GONIOPHILA, (*Flk.*) Thallus effuse, thin, subtartareous, leproso-granulose, rimulose, greyish, or brownish-green; often evanescent. Apothecia small, very numerous, scattered, sessile; disc plane, surrounded by a smooth margin, afterwards convex and immarginate; hypothecium grumous, pale yellowish-brown; paraphyses rather lax; asci numerous, conspicuous, clavate, 8 spored; spores broadly elliptical, unilocular, or each containing one, two, or three rounded globules, hyaline; ·00325 to ·004 in. long, by ·0015 to ·002 in. broad.

Lecidea immersa, γ. *goniophila*, Flk. Berl. Mag. 311.—*L. goniophila*, Schær. Enum. 127, L. H. 531!—Massal. Ric. 70, fig. 133.—*Biatora goniophila*, Hepp. Eur. 129!—*Lecidella goniophila*, Kbr. S. L. G. 235.

β. ACERVATA, *Mudd.* Thallus effuse, subtartareous, granulato-rugose, grey, or greyish-white; granules eventually more or less dissolved, leproso-pulverulent, greenish-yellow. Apothecia small, usually heaped together into convex clusters of from 4 to 20; disc when young plane, black, surrounded by a thin entire margin, at length convex and immarginate; hypothecium thinnish, yellowish-brown; paraphyses lax, their apices very black; asci clavate, conspicuous, 8 spored; spores as above.

On rocks and stones in mountainous districts; frequent. β.—On rocks, High-cliff! Cleveland. These are easily recognised by their numerous small apothecia, conspicuous asci, and by their large broadly elliptical spores.

24. LECIDEA CALCIVORA, (*Ehrh.*) Thallus effuse, thin, tartareous, leprous, greyish-white, or white; often evanescent. Apothecia small, scattered, immersed in the thallus and rock beneath, at length emersed, so as to be nearly on a level with the face of the thallus; disc plane, reddish-black, cæsio-pruinose, or naked; margin thin, eventually disappearing; hypothecium yellowish or reddish-brown; paraphyses diffluent; asci clavate, 8 spored; spores elliptical-oblong, unilocular, subhyaline, or hyaline; ·003 to ·00325 in. long, by ·001 to ·00125 in. broad.

Lichen calcivorus, Ehrh.—*Lichen immersus*, Sm. E. Bot. 193.—*Lecidea immersa*, Ach. Syn. 27.—Hook. Brit. Fl. 2, 179.—*L. albocærulescens. β. immersa*, Fries L. Ref. 295.—Leight. Exs. 94!—*L. immersa, α. calcivora*, Schær. Enum. 126, L. H. 201!—*L. calcivora*, Nyl. Enum. Gen. 125, L. P. 138!—Massal. Ric. 78, fig. 158.—*Biatora immersa*, Hepp. Eur. 240!

On calcareous rocks in mountainous districts. Ingleborough! *Dr. Carrington.* Near Thirsk! *I. G. Baker, Esq.* Near Masham! Yorkshire. This species often resembles states of *Verrucaria immersa.* It may be known by its habit, patellæform pruinose apothecia, yellowish-brown hypothecium, diffluent paraphyses, clavate asci, and spores.

25. LECIDEA ATRO-SANGUINEA, (*Hoffm.*) Thallus effuse, thin, leproso-granulose, grey, or greyish-white; often evanescent. Apothecia minute, numerous, scattered, sessile; disc plane, reddish-black, or black, slightly pruinose, or naked, surrounded by a thin even margin, eventually convex and immarginate; hypothecium thickish, dark-red; paraphyses rather lax, rich yellowish-brown when viewed in masses, their apices dark-red; asci clavate, 8 spored: spores elliptical, or oblong, unilocular, subhyaline; ·00275 to ·0035 in. long, by ·001 to ·00125 in. broad.

Verrucaria punctata, var. *atro-sanguinea*, Hoffm.—*Lecidea immersa*, var. *atro-sanguinea*, Schær. Enum. 127 in pt.—*L. albo-cærulescens*, var. *atro-sanguinea*, Nyl. Enum. Gen. 125.

On rocks and stones, especially such as are calcareous. Near Cork! and Blackwater Bridge! Ireland, *I. Carroll, Esq.* Near Lewes! Sussex, *W. Unwin, Esq.* Bilsdale! Yorkshire, and near Ayton! Cleveland. This species is not identical with *L. prominula*, BORR. as supposed by SCHÆRER. Its nearest ally appears to me to be *goniophila*; from which however, it may always be known by its thicker and much darker coloured hypothecium. The specimen in my copy of *Hepp. Eur* 252! is referrible to the saxicole variety of *L. parasema.*

26. LECIDEA PROMINULA, *Borr.* Thallus thin, subtartareous, rimu-

loso-verruculose, smoky-grey, or greyish-white; hypothallus thin, lead-coloured. Apothecia minute, numerous, scattered, sessile; disc black, at first somewhat concave, becoming plane, surrounded with a slightly elevated margin; hypothecium thin, pale yellowish-brown; paraphyses rather lax, pale, their apices black; asci numerous, conspicuous, broadly clavate, 8 spored; spores elliptical-oblong, unilocular, hyaline; ·00275 to ·003 in. long, by ·0015 in. broad.

Lecidea prominula, Borr. in E. Bot. Suppl. 2687, fig. 1.—Hook. Brit. Fl. 2, 175.

On chalk and flints. On the Downs! Sussex, authentic specimen! in herb. *Rev. W. A. Leighton.* Through the kindness of the gentleman just named I have been permitted to examine an authentic specimen of this species, and am quite satisfied that it is distinct from the preceding species; and also from *Biatorina chalybeia,* to which NYLANDER apparently refers both it and *L. Gagei, Hook.* The variety β. issued by LEIGHTON in his *Exs.* 333! I regard as a state of *L. crustulata.* What *L. Gagei* really is I am unable to say, never having seen authentic specimens. *Mr. Salwey* furnished me with a small specimen of what he regarded as *Gagei.* The thallus of which is effuse, thin, subtartareous, minutely rimulose, of a rusty-brown colour; and the apothecia are minute, scattered, dark-brown or nearly black; disc plane when young, afterwards convex; margin thin, smooth, soon obliterated; hypothecium thin, pale brown; paraphyses lax; asci short, minute, clavate, 8 spored; spores very minute, ovate, or oblong, unilocular, hyaline.

27. LECIDEA UMBONATA, (*Hepp.*) Thallus determinate, tartareous, smooth and even, contiguous, or slightly rimulose, white; circumscribed by a narrow serpentine black line. Apothecia at first minute, innate, afterwards enlarged, sessile; disc umbonate, black; margin thickish, smooth, entire, at length flexuose and twisted; hypothecium thickish, yellowish-brown; paraphyses rather lax, pale, their apices thickened, very black; asci narrow clavate, 8 spored; spores elliptical, unilocular, filled with a finely granular protoplasm, which often collapses toward each extremity of the spore into irregular shaped nuclei, and assumes a subpolari-bilocular aspect, subhyaline, or hyaline; ·0025 to ·003 in. long, by ·001 in. broad.

Biatora umbonata, Hepp. Eur. 257!

On rocks, especially such as are of a calcareous nature, in alpine districts. Braemar! *Admiral Jones.* The chalky-white thallus, twisted umbonate black apothecia, and the internal organization of the spores, are its distinguishing characters.

28. LECIDEA TENEBROSA, (*Flot.*) Thallus subdeterminate, tartareous, rimuloso-areolate, smooth, greyish-brown, or dark-brown; areolæ tumid and angular, somewhat scattered, or crowded; hypothallus thin, black, extended beyond the region of the thallus. Apothecia small, innate in the areolæ, becoming emersed so as to be on a level with the face of the thallus, or a little above it; disc black, depressed, or suburceolate when young, afterwards plane; margin thin, entire; hypothecium thinnish, pale yellow-brown; paraphyses lax, pale, their apices black; asci easily detached from the hypothecium, narrow, elongato-clavate, pedicellate, 6-8 spored; spores oblong, unilocular, subhyaline, or hyaline, ·0025 to ·003 in. long, by ·001 in. broad.

Lecidea tenebrosa, Flot.—Nyl. Enum. Gen. 124.—*Lecidea coracina*, Ach. Syn. 11 in pt.—Massal. Ric. 70, fig. 132.—*Lecanora coracina*, Hepp. Eur. 383 !

On rocks in subalpine and alpine districts. Lough-na-Cat ! Morane ! *Admiral Jones.* Barmouth ! North Wales, *Rev. T. Salwey.* Near Cork ! Ireland, *I. Carroll, Esq.* This species resembles states of *Aspicilia cinerea* in its mode of growth and outward appearance. It may be known at once by its loose paraphyses and asci, both of which separate readily from the hypothecium, and if their form is born in mind no difficulty need be feared as to being able to recognise this species. The specimen issued by LEIGHTON in his *Exs.* 188 ! in my copy is referrible to *L. fumosa.*

29. LECIDEA INTUMESCENS, (*Flot.*) Thallus determinate, tartareous, plicato-verruculose, diffracto-areolate, somewhat shining, olive-brown, or brownish-grey. Apothecia minute, numerous, crowded, appressed; disc plane, black, naked; margin thin, prominent, somewhat polished, persistent; hypothecium carnoso-grumous, yellow-brown; paraphyses subdiffluent; asci clavato-pyriform, 6-8 spored; spores elliptical-oblong, or ovate, more or less filled with a finely granular protoplasm, subhyaline, or hyaline; ·0025 to ·003 in. long, by ·001 in. broad. PLATE 3, *fig.* 76.

Lecidea intumescens, Flot.—Nyl. Enum. Gen. 124, L. P. 58 !—*L. confervoides*, var. *intumescens*, Schær. Enum. 113.—*L. insularis*, Nyl. Obs. Lich. Holm. 1, 6.—Leight. Exs. 161 !—Kbr. S. L. G. 239.

On rocks in mountainous districts. Cliffrigg ! and Lounsdale ! Cleveland, Yorkshire. This species invariably occurs in company with *Lecanora glaucoma*, in this district. Indeed it appears to germinate on the thallus of that species, and to eventually destroy it; but it is not strictly a parasite. It may always be known from the *Lecanora* by the contrast of colour of their thalli, and apothecia.

30. LECIDEA ATRO-BRUNNEA, (*Ram.*) Thallus determinate, tartareo-cartilaginous, verrucoso-areolate, reddish copper-coloured; areolæ somewhat shining, convex, subsquamulose; hypothallus thin, black. Apothecia of a medium size, scattered, appressed; disc black, plane, naked, surrounded by a thickish smooth margin, at length somewhat convex and subimmarginate; hypothecium yellowish-brown; paraphyses rather lax; asci clavate, 8 spored; spores oblong, or ovate, unilocular, hyaline; ·0025 to ·003 in. long, by ·001 to ·00125 in. broad.

Lichen atro-brunneus, Ramond.—*Lecidea atro-brunnea*, Fries L. Ref. 319.—Schær. Enum. 109, L. H. 444 !—*Psora atro-brunnea*, Massal. Ric. 92, fig. 190.—*Lecidella atro-brunnea*, Kbr. S. L. G. 239.

On micaceous and granite rocks in alpine districts. Scotland ! *Mr. R. Jacob.* Its spermogones are generally present. They are small, papillæform, slightly depressed, solitary, brownish-black, seated on the areolæ. The spermatia are numerous, very long and slender, cylindrical, undulated, ·007 to ·008 in. long, by ·00012 in. broad.

31. LECIDEA VIRIDI-ATRA, (*Stenh.*) Thallus determinate, cartilagineo-tartareous, areolate, yellowish-green when recent, afterwards greenish-brown; areolæ plane or tumid, distinct and separate, or approximate and confluent; hypothallus black, determinate. Apothecia of a medium

size, sparingly scattered, solitary, or occasionally confluent, subinnate; disc black, naked, plane or convex; margin thin, soon obliterated; hypothecium carnoso-grumous, yellowish-brown; paraphyses conglutinate, greenish when viewed in masses, their apices black; asci minute, cuneate, 8 spored; spores oblong, or ovate, unilocular, hyaline; ·002 to ·0025 in. long, by ·001 in. broad.

Lecidea viridi-atra, Stenhamm. (non Ach. nec Hook.)—*Biatora viridi-atra,* Fries L. Ref. 277.—Hepp. Eur. 255!—*Lecidea viridi-atra,* Schær. Enum. 108.—*Lecidella alpestris,* Kbr. S. L. G. 242.

On rocks in alpine districts. Lancashire! *Mr. R. Jacob.* Its spermogones are not of unfrequent occurrence. They are sparingly produced, seated about the margins of the areolæ, papillæform, slightly prominent, black, solitary, or confluent and grouped, occasionally surrounded by a pale rim. The spermatia occur in myriads; they are straight, cylindrical, ·0025 in. long, by ·00016 in. broad.

32. LECIDEA AMBIGUA, (*Ach.*) Thallus determinate, tartareous, rimoso-areolate, glaucous, or greyish-white; often tinged with red; areolæ minute, thin, nearly plane, crowded, forming a smooth areolate crust; hypothallus black. Apothecia small, numerous, appressed; disc plane, black, cinereo-pruinose; margin thinnish, erect, at length flexuose; hypothecium yellow-brown; paraphyses conglutinate, pale; asci clavate, 8 spored; spores elliptical-oblong, unilocular, hyaline; ·0025 in. long, by ·001 in. broad.

Lecidea ambigua, Ach. L. Univ. 161.—Nyl. Enum. Gen. 125.—*L. variegata,* Fries L. Ref. 303.—*L. lactea,* Schær. Enum. 114, L. H. 176! and *L. petræa, β.* in pt. Enum. 123.—Leight. Exs. 301!—*Lecidella ambigua,* Kbr. S. L. G. 236.—*Biatora varigata,* and *L. multipunctata,* Hepp. Eur. 245! 260!

On rocks in alpine districts. Barmouth! North Wales, *Rev. W. A. Leighton.* Near Thirsk! Yorkshire, *I. G. Baker, Esq.* Limerick! Ireland; and Ben Lawers! Scotland, *Admiral Jones.* This species often bears a strong resemblance to *Rhizocarpon petræum.* It may be known by its unilocular spores. The differently coloured thallus, and pruinose apothecia, will prevent its confusion with either of the two last species.

33. LECIDEA MELANOPHÆA, *Fries.* Thallus thin, tartareous, continuous, rimulose, smooth, rusty-red; hypothallus thin, black, limited. Apothecia minute, numerous, scattered, partly immersed; disc constantly concave, black; margin thick, erect, even when young, irregular when old; hypothecium thinnish, pale reddish-brown, seated on the face of the cupular exciple; paraphyses subconglutinate; asci broadly clavate, 8 spored; spores elliptical-oblong, unilocular, hyaline; ·0025 to ·003 in. long, by ·00125 in. broad.

Lecidea melanophæa, Fries V. A. H.—*Lichen Œderi,* Sm. E. Bot. 117.—*Lecidea Œderi,* Hook. Brit. Fl. 2, 178.—Tayl. Fl. Hib. pt. 2, 123.—Leight. Exs. 127!—*Urceolaria.* Schær. Enum. 85. L. H. 123!—*Aspicilia.* Massal. Ric. 39, fig. 67.—*A. melanophæa,* Kbr. S. L. G. 159.

On rocks in alpine districts. Teesdale! Durham, *Rev. J. Harriman.* Wreckin Hill! Shropshire, *Rev W. A. Leighton.* Ingleborough! *Dr. Carrington.* Lounsdale! Cleveland. This is easily known by its rusty-red thallus, and urceolate or concave apothecia. It must not however be confounded with *Rhizocarpon petræum*, var. *Œderei*. Their different spores separate them.

34. LECIDEA MOOREANA, *Carr.* Thallus effuse, thin, tartareous, granuloso-verruculose, rugulose, greenish-yellow when wet, greyish-white, or cream-coloured when dry. Apothecia large, solitary, or congregated together into little groups, sessile; disc plane, somewhat scabrous, livid-black when wet, dull-black when dry; margin thin, entire; hypothecium thin, dark-brown; paraphyses very slender, flexuose, mixed with much mucoso-gelatinous matter; asci elongato-clavate, 8 spored; spores elliptical-oblong, or ovate, unilocular, filled with a finely granular protoplasm, subhyaline; ·0035 to ·004 in. long, by ·0015 in. broad.

Lecidea Mooreana, Carroll in litt. 1859.

On trap rocks, especially such as have been long exposed to the weather. Near Belfast! Ireland, *D. Moore, Esq.* This species may be recognised by its mucoso-gelatinous thalamium, very slender flexuose paraphyses, and its remarkably elongated clavate asci, which separate very readily from the face of the hypothecium.

35. LECIDEA PROTRUSA, *Fries.* Thallus effuse, thickish, tartareous, at first contiguous, afterwards rimose and verrucoso-areolate, rugulose, pale sulphur-coloured or creamy-white; hypothallus obliterated. Apothecia of a medium size, usually congregated together into little groups, which eventually become more or less confluent, subsessile; disc black, plane, smooth when young, at length rugulose, convex; margin thin, smooth, entire, eventually obliterated; hypothecium thinnish, reddish or dark-brown; paraphyses subconglutinate, pale, their apices black; asci clavate, 8 spored; spores elliptical, or ovate, unilocular, hyaline; ·0025 to ·003 in. long, by ·00125 to ·0015 in. broad.

Lecidea protrusa, Fries L. Ref. 324.—Schær. Enum. 115, L. H. 578!—Massal. Ric. 75, fig. 150.—*L. scabra*, Tayl, Fl. Hib. pt. 2, 121.—*L. enterochlora*, Leight. Exs. 299! (in my copy.)—*Lecidella protrusa*, Kbr. S. L. G. 242.

On rocks and stones in alpine districts. Dunkerron! *Dr. Taylor.* Scilly Islands! *Miss Miller.* Near Ayton! Cleveland. Its spermogones are occasionally present. They are minute, subpapillæform, slightly prominent, brownish-black, sparingly scattered over the face of the thallus. The spermatia are cylindrical, curved, or undulated, ·004 to ·005 in. long, by ·00012 in. broad.

36. LECIDEA FURVELLA, *Nyl.* Thallus thick, subdeterminate, or effuse, granuloso-furfuraceous or somewhat isidiiferous, diffracto-areolate, dark olive-brown, or nearly black. Apothecia small, scattered, appressed; disc plane, black, rugulose; margin thin, smooth and somewhat shining, flexuose, persistent; hypothecium thin, yellowish-brown, seated on the carbonaceous exciple; paraphyses diffluent; asci clavate, 8 spored; spores oblong, or ovate, unilocular, filled with a finely granular protoplasm, subhyaline, or hyaline; ·003 in. long, by ·001 to ·00125 in. broad.

Lecidea furvella, Nyl. in litt. 1860.

On rocks in alpine districts. Ben Lawers! *Admiral Jones.* This is a very distinct species. It may be known by its thallus, which has a remarkable furfuraceous appearance, and resembles that form of thallus which is so frequently observable in the crustaceous species when in a state of decay, and, by its apothecia, which are closely appressed, flat, black, and surrounded by a smooth, flexuose, persistent margin.

Sect. 3.—*Apothecia black ; hypothecium carbonaceous.*

37. Lecidea fuliginosa, *Tayl.* Thallus subtartareous, glebuloso-squamulose, olive-brown ; squamules scattered, hemispherical, entire ; hypothallus brownish-black, subbyssoid. Apothecia small, sparingly produced, solitary, or two or three aggregated together ; disc black. convex, or subglobose ; margin thin, soon obliterated ; hypothecium thick, brownish-black ; paraphyses conglutinate, pale yellowish-brown when viewed in masses, their apices brownish-black ; asci clavate, 8 spored ; spores elliptical, or ovate, unilocular, hyaline ; ·002 to ·00275 in. long, by ·001 in. broad.

Lecidea fuliginosa, Tayl. Fl. Hib. pt. 2, 131.—Leight. Exs. 305 !

On siliceous rocks. Carig Mountain ! Co. of Kerry, *Dr. Taylor.* Barmouth ! North Wales, *Rev. T. Salwey.* Glengariff ! Ireland, *I. Carroll, Esq.* This species is a very distinct one, and may be known at first sight, by its scattered and friable glebuloso-squamulose thallus, and brownish-black somewhat byssoid hypothallus.

38. Lecidea aggerata, *Mudd.* Thallus effuse, thinnish, subtartareous, granulose, rimoso-areolate, greyish-brown, or grey. Apothecia minute, numerous, aggregated together into little masses, rarely solitary ; disc convex, immarginate ; hypothecium thinnish, black ; paraphyses somewhat lax, bright bluish-green when viewed in masses, their apices black ; asci minute, clavate, 8 spored ; spores oblong, unilocular, hyaline ; ·00175 to ·002 in. long, by ·00075 in. broad.

On rocks, old walls, etc., in mountainous districts. Langbraugh-rigg ! and near Battersby ! Cleveland. This is, apparently, a very distinct species. Its apothecia are very minute, usually aggregated together into little heaps, 4 to 12, or more in number. The spermogones are generally present on good specimens. They are very minute, invisible to the eye when unaided, subverrucæform, solitary, black, scattered over the whole face of the thallus. The spermatia are straight, cylindrical, ·00125 in. long, by ·00025 in. broad.

39. Lecidea expansa, (*Nyl.*) Thallus very thin, submembranaceous, contiguous, smooth, or minutely verruculose, black. Apothecia minute, very numerous, scattered, solitary, sessile ; disc plane, very black, surrounded by a thin smooth margin ; hypothecium thin, brownish-black ; paraphyses rather lax, pale, their apices very black ; asci small, clavate, 8 spored ; spores minute, elliptical, unilocular, hyaline ; ·00175 in. long, by ·0005 in. broad.

Lecidea expansa, Nyl.—Leight. Exs. 186 !

On the smooth surface of water-washed sandstone boulders, near Battersby ! and near Roseberry ! Cleveland. The thallus of this species is extremely thin, forming ink-like stains on the face of the boulders. The apothecia are very black, abundant, scattered, punctiform when young, explanate and more enlarged when mature. Its spermogones are usually present. They are exceedingly minute, very numerous, punctiform, slightly prominent, solitary, black, indiscriminately scattered over the whole surface of the thallus. The spermatia are rather large in comparison with the minuteness of the spermogones; they are cylindrical, or subellipsoid, ·001 in. long, by ·00025 in. broad.

40. LECIDEA CRUSTULATA, (*Ach.*) Thallus effuse, thin, leproso-tartareous, subareolate, greyish-white, or olive; hypothallus black, evanescent. Apothecia small, very numerous, scattered, solitary, sessile; disc plane, or somewhat convex, black, surrounded by a thin entire margin; hypothecium thickish, brownish-black; paraphyses rather lax, pale, their apices very black; asci subclavate, 8 spored; spores oblong, or ovate, unilocular, more or less filled with a finely granular protoplasm, subhyaline, or hyaline; ·003 to ·004 in. long, by ·00125 to ·0015 in. broad.

Lecidea parasema, var. *crustulata*, Ach. Syn. 18.—*L. nitidula*, c. Fries L. Ref. 308.—*L. crustulata*, Schær. Enum. 128, L. H. 447!—Massal. Ric. 76, fig. 153.—Kbr. S. L. G. 249.—*Biatora crustulata*, Hepp. Eur. 130.

β. FUSCELLA, *Mudd.* Thallus effuse, thin, rimoso-areolate, brownish-grey. Apothecia minute, scattered, sessile; disc plane, black, surrounded by a thin smooth margin.

Lecidea prominula, *β*. Borr. E. Bot. Suppl. 2687, fig. 1.—Hook. Brit. Fl. 2, 176.—Leight. Exs. 333!

On rocks and stones; frequent. These are easily recognised by their thin thallus, and their numerous small black apothecia.

41. LECIDEA LAPICIDA, *Fries.* Thallus subdeterminate, tartareous, thin, rimoso-areolate, verruculose, glaucous, or greyish-white; hypothallus thin, black, often surrounding the thallus at its cumference in the form of a serpentine line. Apothecia small, very numerous, crowded, angular-difformed by compression, sessile; disc plane, very black, naked; margin thin, prominent; hypothecium thick, dense, brownish-black; paraphyses subconglutinate; asci ventricoso-clavate, 8 spored; spores oblong, or ovate, unilocular, hyaline; ·003 in. long, by ·001 in. broad.

Lecidea lapicida, Fries L. Ref. 306.—Leight. Exs. 157.—Kbr. S. L. G. 250.

β. SILACEA, (*Ach.*) Thallus areolato-verrucose, rusty-red. Apothecia as above.

Lichen silaceus, Ach. Prod. Sm. E. Bot. 1118 in pt.—*Lecidea silacea*, Hook. Brit. Fl. 2, 178 in pt.—Schær. Enum. 116, L. H. 191!—Massal. Ric. 66, fig. 123 in pt.

On rocks, old walls, etc., in mountainous districts; frequent. This species may be known by its thin and somewhat limited thallus, and its small, crowded, and angular-difformed apothecia. *L. silacea*, appears to me to be only a variety of the present species. The spermogones are occasionally present. They are excessively minute, punctiform, semi-immersed, black, isolated, sparingly scattered towards the periphery, or immersed in the minute thallodal verrucæ which occur on the surface of the centre of the thallus. The spermatia are very numerous, fine, and delicate, cylindrical, or subacicular, ·003 in. long, by ·0001 in. broad.

42. LECIDEA CONTIGUA, *Fries.* Thallus effuse, tartareous, thinnish, at first contiguous, afterwards rimulose, or subverruculose, glaucous, or

greyish-white; hypothallus thin, black, often presented as a narrow serpentine line at the circumference of the thallus. Apothecia of a medium size, numerous, subinnate; disc plane, black, naked, or cinereo-pruinose, surrounded by a rather thin smooth margin, at length convex, and immarginate; hypothecium thickish, brownish-black; paraphyses subconglutinate; asci clavate, 8 spored; spores elliptical, or ovate, unilocular, filled with a finely granular protoplasm, subhyaline, or hyaline; ·004 to ·00425 in. long, by ·0015 to ·002 in. broad.

Lecidea contigua, Fries L. Ref. 298.—Schær. Enum. 119, L. H. 446!—Massal. Ric. 75, fig. 148.—Leight. Exs. 155! 156!—Kbr. S. L. G. 247.—Nyl. Enum. Gen. 125.—*Lichen miscellus*, Sm. E. Bot. 1831.—*Lecidea viridi-atra*, Hook. Brit. Fl. 2, 177.—*Biatora contigua*, Hepp. Eur. 126! and *B. crustulata*, var. *macrospora*, Hepp. Eur. 264!

b. CONVEXA, *Fries*. Thallus thin, subareolato-verrucose. Apothecia somewhat shining, naked, black, convex, immarginate.

L. contigua, b. *convexa*, Fries L. Ref. 299.—Leight. Exs. 337!—Kbr. S. L. G. 247.

On rocks and stones in mountainous districts; common. The spermogones are occasionally met with. They are indiscriminately scattered over the surface of the thallus, minute, punctiform, or subverrucæform, somewhat prominent, black. The spermatia are straight, cylindrical, ·002 in. long, by ·0001 in. broad. The following forms appear to me to be only varieties of the present species.

β. PLATYCARPA, (*Ach.*) Thallus effuse, thinnish, tartareo-pruinose, rimulose, rugulose, greyish-white, often evanescent; hypothallus thin, black. Apothecia large, scattered, sessile; disc black, naked, plane when young and surrounded by a tumid margin, afterwards convex and immarginate; paraphyses conglutinate. Asci and spores as in *contigua*.

Lecidea platycarpa, Ach. L. Univ. 173.—Schær. Enum. 123, L. H. 228!—Massal. Ric. 67, fig. 125.—Kbr. S. L. G. 249.—*L. contigua*, var. *platycarpa*, Fries L. Ref. 300.—Nyl. Enum. Gen. 125, L. P. 141!

b. STERIZA, (*Flk.*) Thallus often obliterated, or none. Apothecia very large; disc black, plane when young, convex and immarginate when old.

L. platycarpa, var. *steriza*, Flork.—Kbr. S. L. G. 249.—Hepp. Eur. 265!

On rocks and stones, in damp situations; common. The spermogones and spermatia are similar to those of the preceding. It may be known by its thin thallus, and large prominent black apothecia.

γ. CONFLUENS, (*Weber.*) Thallus effuse, or subdeterminate, tartareous, thick, rimuloso-verrucose, glaucous, or greyish-white; hypothallus thin, black, occasionally presented as a narrow serpentine line at the circumference of the thallus. Apothecia large, numerous, scattered, or crowded and confluent; disc black, naked, plane when young, afterwards tumid and convex; margin thickish, smooth, entire, soon obliterated; paraphyses conglutinate; asci elongato-clavate, 8 spored; spores as in *contigua*.

Lichen confluens, Weber.—Sm. E. Bot. 1964.—*Lecidea confluens*, Ach. Syn. 16.—Hook. Brit. Fl. 2, 175.—Schær. Enum. 118, L. H. 187!—Massal. Ric. 66. fig. 122.—Kbr. S. L. G. 250.—*Biatora*. Hepp. Eur. 125!

On rocks and walls in mountainous districts ; common.

δ. ochromela, (*Ach.*) Thallus tartareous, rimulose, rusty-red. Apothecia and spores as in *confluens.*

Lecidea confluens, var. *ochromela,* Ach —Schær. Enum. 118, L. H. 188 ! and *L. dubia,* Schær. Enum. 116, L. H. 190 !—*L. silacea,* Hook. Brit. Fl. 2. 178 in pt.—Massal. Ric. 66 in pt.—B. *ochromela,* Hepp. Eur. 259 !—*L. contigua,* var. *flavicunda,* Nyl. Enum. 125.

On rocks and stones in alpine districts ; frequent. This appears to be only a state of the preceding, in which the thallus is tinged with oxide of iron.

43. Lecidea albocærulescens, (*Wulff.*) Thallus effuse, thin, tartareous, smooth, rimulose, glaucous, or dull-white ; hypothallus very thin, black, at times presented as a narrow serpentine line at the circumference of the thallus. Apothecia of a medium size, scattered, solitary, appressed ; disc plane, black, cæsio-pruinose, surrounded by a rather thin black margin ; hypothecium thinnish ; paraphyses subconglutinate ; asci subclavate, 8 spored ; spores elliptical-oblong, or ovate, unilocular, subhyaline, or hyaline ; ·0035 in. long, by ·00125 in. broad.

Lichen albocærulescens, Wulff.—*Lecidea albocærulescens,* Ach. Meth. 55.—Schær. Enum, 118, L. H. 471 !—Massal. Ric. 72. fig. 140.—Kbr. S. L. G. 247.—*Biatora.* Hepp. Eur. 243 !

b. alpina, (*Schær.*) Thallus thick, rimoso-areolate, glaucous. Apothecia large, plane or tumid ; margin somewhat flexuose ; spores as above.

Lecidea albocærulescens, β. *alpina,* Schær. Enum. 119, L. H. 185 !

c. flavocærulescens, (*Ach.*) Thallus thinnish, ochraceous, or rusty-red. Apothecia and spores as in the normal form.

Lecidea flavocærulescens. Ach. Syn. 23.—Massal. Ric. 73.—*L. albocærulescens,* a. Schær. Enum. 119, L. H. 186 !—*Biatora flavocærulescens,* Hepp. Eur. 244 !

On rocks and stones in subalpine and alpine districts ; frequent. The spermogones are occasionally present. They are usually scattered towards the periphery of the thallus, minute subverrucæform, slightly prominent, black, often surrounded by a narrow thallodal rim. The spermatia are straight, cylindrical ; ·002 in. long, by ·0001 in. broad.

44. Lecidea fumosa, (*Hoffm.*) Thallus subdeterminate, cartilaginous, areolate, olive, or olive-brown ; areolæ plane, or slightly convex, angular, smooth, and somewhat shining ; hypothallus thin, black. Apothecia rather large,or of a medium size, numerous, appressed ; disc black, plane cinereo-pruinose, surrounded by a thin entire margin, at length tumid or convex, naked, and subimmarginate ; hypothecium thick, brownish-black ; paraphyses conglutinate ; asci oblongo-clavate, 8 spored ; spores elliptical, or ovate, unilocular, subhyaline, or hyaline , ·003 in. long, by ·001 to ·00125 in. broad.

Patellaria fumosa, Hoffm.—*Lecidea fumosa,* Ach. Syn. 12.—Kbr. S. L. G. 253.—*Lichen cechumenus,* Sm. E. Bot. 1830.—*L. cechumena,* Hook. Brit. Fl. 2. 175 (excl. the var. β.) —*L. fuscoatra,* Fries L. Ref. 316.—Leight. Exs. 215 ! 239 ! and 188 !—Nyl. Enum. Gen. 125.—*L. fumosa,* a. Schær. Enum. 110, L. H. 470 !—*Psora fumosa,* Massal. Ric. 93.

β. deusta, (*Fries.*) Thallus areolate, from olive-brown becoming nearly black; areolæ at first polished, afterwards dull, flat, suborbicular. Apothecia small, appressed; disc plane, black, cinerio-pruinose; margin thin, elevated, at length flexuose.

Lecidea fuscoatra, var. *deusta*, Fries Exs. 405.—Leight. Exs. 240! 278!—*B. fumosa*, Hepp. Eur. 131.

γ. GRISELLA, *(Flork.)* Thallus cartilaginous, areolato-plicate, pale olive; areolæ rather dull, crowded, angular, plane or tumid. Apothecia subinnate; disc black, plane, slightly cinereo-pruinose, surrounded by a thin entire margin.

Lecidea fumosa, ver. *grisella*, Flork. Schær. Enum. 110, L. H. 625! —Kbr. S. L. G. 253.—*Psora fumosa*, var. *grisella*, Massal. Ric. 94.—*Lichen diacapsis*, Sm. E. Bot. 1954.—*L. lapicida*, β. Hook. Brit. Fl. 2, 175.

On rocks in alpine districts; frequent. The spermogones are of common occurrence. They are of a medium size, verrucæform, slightly prominent, brownish-black, surrounded by a pale thallodal rim, usually immersed in the convexities of the thallus, but most abundant toward the periphery, solitary, or congregated together into little groups, and occasionally confluent. The spermatia are very numerous, straight, cylindrical, ·002 in. long, by ·0001 in. broad.

SECT. 4.—*Species athalline; parasitic on the thallus of other lichens.*

45. LECIDEA VITELLINARIA, *Nyl.* Apothecia parasitic on the thallus of *Callopisma vitellinum*, very minute, scattered, sessile; disc black, from concave becoming plane, naked, surrounded by a slightly elevated and polished margin; hypothecium thin, incorporated with the cupular exciple; paraphyses subconglutinate, pale, their apices greenish-black; asci clavate, 8 spored; spores elliptical, or ovate, unilocular, hyaline; ·00175 to ·002 in. long, by ·001 in. broad. PLATE 3, *fig.* 77.

Lecidea vitellinaria, Nyl. Obs. Lich. Holm. 1. 6.—Leight. Exs. 182!

Parasitic on the thallus of *Callo. vitellinum*, on whinstone rocks, near Newton! Langbraugh-rigg! and Battersby! all in Cleveland, Yorkshire. This is a very distinct species. Its presence or absence on the alien thallus, is easily ascertained from the contrast of colour of its apothecia.

46. LECIDEA OBSCUROIDES, *Linds.* Apothecia parasitic on the thallus of *Borrera obscura*, very minute, congregated together into little groups, about the ends of the laciniæ of the alien thallus, at first punctiform, and immersed, afterwards more or less emersed and explanate; disc brownish-black, slightly concave, or plane; asci oblongo-clavate, 8 spored; spores elliptical-oblong, unilocular, filled with a grumous protoplasm, subhyaline.

Lecidea obscuroides, Linds. Mem. Spermo. 247, pl. 13. fig. 36. 37. 38.

"Parasitic on the thallus of *Borrera obscura*, on the trunks of trees under Dunscombe's Wood, Cork, *I. Carroll, Esq.*" I have never seen this species.—*Vide* DR. LINDSAY'S *Memoir on the spermogones and pycnides of filamentous, fruticulose, and foliaceous lichens*, p. 247.

GENUS 16. SCHÆRERIA, *Kbr.*

Apothecia open from the first, patellæform, margined by a brownish-black subceraceous cupular proper exciple; thalamium arising from a brownish subgrumous simple hypothecium; asci elongated, sublinear, attenuated at the base, 8 spored, uniserial; spores globose, unilocular, uncoloured. Thallus crustaceous, subeffigurate; hypothallus black.

1, **SCHÆRERIA LUGUBRIS**, (*Sommf.*) Thallus cartilaginous, squamuloso-areolate, olive, or reddish-brown; squamules plano-convex, aggregated into an areolate crust; hypothallus, black. Apothecia small, numerous, scattered, sessile; disc plane, black, naked; margin subprominent, obtuse, entire; hypothecium brownish, subgrumous; paraphyses lax; asci elongated, sublinear, easily detached from the hypothecium, 8 spored; spores globose unilocular, filled with a granular protoplasm, or hyaline; ·00175 in. in diameter. PLATE 4, *fig.* 78.

Lecidea lugubris, Sommf.—Fries L. Ref. 314.—Schær. Enum. 101. —Linds. in Micr. Journ. Vol. 5. Pl. 11.—*Schæreria lugubris*, Kbr. S. L. G. 232.

On rocks in subalpine and alpine districts. Moor immediately to the west of Braemar! *Dr. Lindsay.* Highlands! *Admiral Jones.* On an old wall east of Cook's Monument! near Ayton, Cleveland, Yorkshire. This is a well characterised plant. It may be known from all the other species in the present tribe, by its narrow asci, and globose uncoloured spores. Its spermogones are occasionally present. They are very minute, punctiform or subverrucæform, slightly prominent, black, sparingly scattered over the whole surface of the thallus, or only on sterile squamules. The spermatia are straight, cylindrical; ·00075 to ·001 in. long, by ·00012 in. broad.

GENUS 17. MEGALOSPORA, (*Mey. and Fw.*)

Apothecia open from the first, hemispherico-convex, immarginate, at length dilated and somewhat difformed; thalamium arising from a sanguinous floccoso-grumous simple hypothecium; asci oblongo-ventricose, one spored; spores elliptical-oblong, unilocular, pale yellow, or uncoloured. Thallus crustaceous, uniform; hypothallus white.

1. **MEGALOSPORA SAGUINARIA**, (*L.*) Thallus effuse, thick, subtartareous, friable, granuloso-verrucose, greyish-white. Apothecia rather large, numerous, scattered or crowded, and at times confluent, adnate; disc black, naked, convex, immarginate; hypothecium floccoso-grumous, bright red; paraphyses conglutinate, olive-green when viewed in masses, their apices black; asci oblongo-ventricose, one spored; spores elliptical-oblong, unilocular, filled with a grumous protoplasm, pale yellow, or hyaline; ·015 to ·018 in. long, by ·007 to ·008 in. broad. PLATE 4. *fig.* 79.

Lichen sanguinarius, L.—Sm. E. Bot. 155.—*Lecidea sanguinaria*, Ach. Syn. 19.—Fries L. Ref. 335.—Hook. Brit. Fl. 2, 177.—Schær. Enum. 132.—Leight. Exs. 307!—Nyl. Enum. Gen. 127.—*Megalospora sanguinaria*, Massal. Ric. 106. fig. 211.—Kbr. S, L. G. 257.

On rocks and stones, and on the trunks of old trees, in subalpine districts. Brimham Rocks! near Ripon, *W. Brunton, Esq.* Teesdale! Durham, *Rev. J. Harriman.* Carlton Bank! Ingleton Park! Baysdale! and Kildale! all in Cleveland. This species may be easily recognised by the peculiar colour of its hypothecium, one spored asci, and large unilocular spores. Its spermogones are generally present. They are very minute, black, punctiform, immersed or semi-immersed in the thallodal verrucæ, usually very numerous, often crowded but rarely confluent. The spermatia are very abundant, straight, cylindrical, ·002 in. long, by ·00012 in. broad.

GENUS 18. BUELLIA, (*De Not.*)

Apothecia open from the first, patellæform, margined by a carbonaceous proper exciple, at times becoming hemispherico-convex, subobliterating the margin; thalamium arising from a brownish-black, carbonaceous, simple hypothecium; asci clavate, or oblongo-clavate, 8 spored; spores elliptical, or oblong, often constricted in the middle, bilocular, coloured. Thallus crustaceous, uniform; hypothallus black, more or less distinct.

1. BUELLIA BADIOATRA, (*Flk.*) Thallus tartareo-subcartilaginous, areolate, varying in colour from pale brown to reddish-brown; areolæ minute, plane, or convex, scattered and distinct, or crowded and forming a rimulose crust; hypothallus thin, black. Apothecia small, scattered, slightly raised above the level of the areolæ; disc plane, black, naked, surrounded by a thin, entire, even, or flexuose margin; hypothecium thin; paraphyses capillary, pale, rather lax; asci ventricose, 8 spored; spores elliptical-oblong, or oblong, their extremities rounded, or attenuated, bilocular, often slightly constricted in the middle, variable in colour, pale yellow, pale green, dark-green, or greenish-brown, according to the degree of development; ·005 to ·006 in. long, by ·00225 to ·003 in. broad. PLATE 4. *fig.* 81.

Lecidea badioatra, Flk.—Schær. Enum. 111, L. H. 179! *L. atroalba*, Fw.—Fries L. Ref. 310 in pt.—*L. confervoides*, α. et ε. et *L. amphibia*, in pt. Schær. Enum. 113, 112, L. H. 178!—*Catolechia badioatra*, Massal. Ric. 84, fig. 172.—*L. badioatra*, β. *fuscoatra*, et *L. confervoides*, γ. et δ. Hepp. Eur. 32! 34! 35!—*Buellia badioatra*, Kbr. S. L. G. 223.

β. ATROALBELLA, (*Nyl.*) Thallus thin, rimuloso-areolate, greyish-brown, becoming dark-brown; areolæ very minute, crowded, plane, or convex; hypothallus black. Apothecia minute, numerous, subinnato-sessile; disc plane, black; margin thin, even, often obliterated; spores elliptical-oblong, often slightly constricted in the middle, bilocular, varying in colour from pale green to dark-brown; ·003 to ·0035 in. long, by ·00125 to ·00175 in. broad.

Lecidea atroalba, var. *atroalbella*, Nyl. Obs. Lich. Holm. 2, 11.—Leight. Exs. 184!

On rocks in mountainous districts. Ben Lawers! *Admiral Jones.* Lyth Hill! Shrewsbury, Shropshire, *Rev. W. A. Leighton.* Ardglass! Co. Down, *Dr. Maingay.* Derriquin! Co. Kerry, *Dr. Taylor* Near Cork! *I. Carroll, Esq.* Penhill! Yorkshire, *I. G. Baker, Esq.* I see no permanent character whereby *L. badioatra* and *L. confervoides* can be distinguished even as varieties. The specimens issued by SCHÆRER, and HEPP, appear to me to be only one species in different stages of development.

2. BUELLIA CORACINA, (*Hoffm.*) Thallus suborbicular, determinate, very thin, rimuloso-areolate, dark-brown or nearly black; areolæ very minute, crowded, flat, somewhat confluent at the circumference; hypo-

thallus black, usually extended a little beyond the region of the thallus. Apothecia very minute, numerous, innate, or innato-sessile ; disc plane, or slightly convex, black ; margin thin, entire, often obliterated ; paraphyses capillary, diffluent ; asci clavate, 8 spored ; spores oblong, obtuse, often constricted in the middle, and at other times slightly bent, bilocular, varying in colour from pale green to dark-brown ; ·0025 to ·003 in. long, by ·00125 to ·00175 in. broad.

Verrucaria coracina, Hoffm.—*Lecidea morio, γ. coracina,* Schær. Enum. 108 in pt.—*Catolechia moriopsis,* Massal. Ric. 85, fig. 175.—*L. coracina,* Hepp. Eur. 31 !—*Buellia coracina,* Kbr. S, L. G. 224.

On rocks in subalpine, or mountainous districts. Lynmouth ! North Devonshire, *Miss M. Atwood.* Ingleborough ! *Dr. Carrington.* Kinsale ! Ireland, *I. Carroll, Esq.* Battersby Bank ! and near Ayton ! Cleveland, Yorkshire. This species may be known by its very thin dark-brown or black thallus, minute apothecia, and oblongo-obtuse spores.

3. Buellia atrata, (*Smith.*) Thallus subdeterminate, thin, rimuloso-areolate, dark-grey, or nearly black ; areolæ minute, smooth, more or less crowded, angular, plane, or slightly convex ; hypothallus very black. Apothecia produced from the hypothallus, minute ; disc plane, very black ; margin thickish, smooth, entire ; hypothecium thickish, brownish-black ; paraphyses subconglutinate ; asci clavate, 8 spored ; spores oblong, elliptical, or subrotund, bilocular, or unilocular, dark reddish-brown ; ·003 to ·0035 in. long, by ·0015 to ·002 in. broad. Plate 4, *fig.* 80.

Lichen atratus, Sm. E. Bot. 2335.—*Lecidea atrata,* Hook. Brit. Fl. 2, 174.—Hepp. Eur. 312 !—*L. morio, β. coracina,* Fries. L. Ref. 320 in pt. Schær. Enum. 108 in pt. and *Urceolaria cinerea* var. *atrocinerea* Schær. Enum. 87, L. H. 129 in pt.

On rocks in alpine districts. Morane ! *Admiral Jones.* Barmouth ! *Rev. T. Salwey.* This species may be recognised by its thin areolate greyish-black thallus, very black hypothallus, slightly prominent apothecia, and by its oblong or subrotund, unilocular or bilocular dark-brown spores.

4. Buellia verruculosa, (*Borr.*) Thallus subdeterminate or effuse, thin, rimuloso-areolate, greenish-yellow ; areolæ very minute, smooth, flat, or a little convex, scattered, or crowded and confluent ; hypothallus brownish-black, often indistinct. Apothecia very minute, innate in the areolæ, solitary ; disc depressed, black, subsequently plane ; margin thin, entire, soon obliterated ; paraphyses rather lax ; asci broadly clavate, 8 spored ; spores oblong, at times slightly constricted in the middle, and at others a little curved, bilocular, varying in colour from pale green to dark-brown ; ·0025 to ·003 in. long, by ·00125 to ·00175 in. broad.

Lichen verruculosus, E. Bot. 2317.—*Lecidea verruculosa,* Borr.—Hook. Brit. Fl. 2. 174.—Leight. Exs. 189 !—Schær. Enum 114.

β. spuria, (*Schær.*) Thallus thinnish, tartareous, areolato-verrucose, white, or cream-coloured ; areolæ smooth, plano-convex, scattered. Apothecia minute, very numerous, subinnato-sessile ; disc black, plane, subimmarginate ; spores as above.

Lecidea spuria, Schær. Enum. 114.—Hepp. Eur. 33 !—Leight.

Exs. 217!—*Catolechia lactea,* and *C. Recobariana,* Massal. Ric. 84. 85.
On rocks in mountainous districts. Dunkerron! *Dr. Taylor.* Blackwater Bridge! Co. Kerry, *I. Carroll Esq.* Lyth Hill! Shropshire, *Rev. W. A. Leighton.* Lynmouth! *Miss M. Atwood.* Carlton Bank! and Cliffrigg! Cleveland.

5. Buellia stellulata, (*Tayl.*) Thallus suborbicular, thin, tartareous, rimuloso-areolate, white, or greyish-white; areolæ minute, smooth, rounded, aggregated in a subradiate manner; hypothallus thin, black, more or less extended beyond the region of the thallus. Apothecia minute, very numerous, crowded, at times confluent, subinnate; disc black, plane; margin thin, entire, eventually obliterated; hypothecium thinnish, brownish-black; paraphyses rather lax; asci clavate, 8 spored; spores oblong, at times slightly constricted in the middle, bilocular, varying in colour from pale green to reddish-brown; ·002 to ·00275 in. long, by ·001 to ·0015 in. broad.

Lecidea stellulata, Tayl. Fl. Hib. pt. 2. 118.—Leight. Exs. 276!

On rocks and stones. Barmouth! *Rev. W. A. Leighton.* Lynmouth! *Miss M. Atwood.* Ardglass! Co, Down, *Dr. Maingay.* Near Cork! *I. Carroll, Esq.* This species may be easily known by its thin areolate white thallus, and very numerous minute apothecia.

6. Buellia saxatilis, (*Schær.*) Thallus thickish, tartareous, rimose, dull white; hypothallus white. Apothecia minute, sparingly produced, irregularly scattered, at first innate, afterwards sessile; disc very black, plane, somewhat rugulose, naked, surrounded by a sligtly elevated entire margin; paraphyses rather lax, pale; asci oblong or ovate, 8 spored; spores oblong, bilocular, varying in colour from pale brown to dark-brown; ·002 to ·0025 in. long, by ·001 in. broad.

Calicium saxatile, Schær. Enum. 166, L. H. 240!—Fries L. Ref. 400. —*Lecidea saxatilis,* Hepp. Eur. 145!—*Buellia saxatilis,* Kbr. S. L. G. 228.

On shaded rocks in subalpine districts. One specimen! (unnamed) in herb, *I. Carroll, Esq.* Barmouth! North Wales, *Rev. T. Salwey.* The spermogones are usually present; they are sparingly scattered toward the circumference of the thallus, punctiform, slightly prominent, black.

7. Buellia disciformis, (*Fries*) Thallus thin, submembranaceous, smooth, even, rimulose, white, or greyish-white; hypothallus thin, black, usually presented as a narrow serpentine line at the circumference of the thallus. Apothecia large, numerous, scattered, sessile; disc black, plane, surrounded by a thin entire margin, subsequently convex, the margin more or less obliterated; paraphyses somewhat lax, greenish-brown when viewed in masses; asci clavate, 8 spored; spores oblong, or sublinear-oblong, straight, or slightly curved, bilocular, varying in colour from green to dark-brown; ·004 to ·005 in. long, by ·0015 to ·002 in. broad.

Lecidea parasema, var. *disciformis,* Fries Exs. 215, L. Ref. 330 in pt. —*L. punctata,* var. *parasema,* Schær. Enum. 129, L. H. 197!—Hepp. Eur. 315! *L. tersa,* Ach. L. Univ. 182, and *L. parasemus.* Ach. Prod. 64 in pt.—*Buellia parasema, α. tersa,* Kbr. S. L. G. 228.—*L. disciformis,* Nyl. Enum. Gen. 126.—Leight. Exs. 180!

β. RUGULOSA, (*Ach.*) Thallus thickish, rimuloso-areolate, rugulose, white, or greyish-white. Apothecia of a medium size, sessile; disc plano-convex, black; spores rather smaller in size, otherwise as above.

Lecidea parasema, var. *rugulosa*, Ach. L. Univ. 176.—*L. punctata*, var. *rugulosa*, Schær. Enum. 129.—Hepp Eur. 316;—*Buellia major*, Massal. Ric. 81, fig. 164.—*B. parasema*, var. *rugulosa*, Kbr. S. L. G. 228.

γ. SAPROPHILA, (*Ach.*) Thallus thin, white, often obliterated. Apothecia rather large; otherwise as in the normal form.

Lecidea parasema, var. *saprophila*, Ach. L. Univ. 177.—*L. punctata*, var. *saprophila*, Schær. Enum. 130, L. H. 198!—Hepp. Eur. 150!

On the trunks of trees, old pales, and occasionally on rocks; frequent. The spermogones are not unfrequently present. They are distributed chiefly toward the circumference of the thallus, minute, punctiform, semi-immersed, black. The spermatia are abundant, cylindrical, straight, ·00125 in. long, by ·00012 in. broad.

8. BUELLIA MYRIOCARPA. (*DC.*) Thallus effuse, very thin, subtartareous, rimulose, uneven and somewhat rugulose, greyish-white. Apothecia minute, very numerous, crowded, sessile; disc black, plane when young, subsequently convex; margin thin, entire, soon obliterated; paraphyses subconglutinate; asci subulato-clavate, 8 spored; spores oblong, or elliptical-oblong, bilocular, straight, or slightly curved, brown, or dark-reddish-brown; ·003 to ·00325 in. long, by ·001 to ·00125 in. broad.

Lecidea myriocarpa, DC.—Nyl. Enum. Gen. 126 in pt.—*L. disciformis*, var. *myriocarpa*, Leight. Exs. 181!—*Buellia stigmatea*, Kbr. S. L. G. 226.—*Lecidea mycraspis*, and *L. Dubyanoides*, Hepp. Eur. 321! 323!—*L. punctiformis*, Auct. in pt.

β. PUNCTIFORMIS, (*Hoffm.*) Thallus effuse, thinnish, uneven, rugulose, greyish-white. Apothecia minute, very numerous, crowded, sessile; disc plane or tumid, very black; margin thin, evanescent; spores as above.

Verrucaria punctata, var. *punctiformis*, Hoffm.—*Lichen pinicola*, Ach.—Sm. E. Bot. 1851.—*Lecidea pinicola*, Hook. Brit. Fl. 2. 176.—Leight. Exs. 63!—*L. punctata*, var. *punctiformis*, Schær. Enum. 129, L. H. 200!—*Buellia punctiformis*, and β. *tumidula*, Massal. Ric. 82. fig. 167. 168.—*L. punctiformis*, α. and β. Hepp. Eur. 41! 42! and *L. puctiformis*, b. *fuliginosa*, and γ. *muscicola*, Hepp. Eur. 317! 318!—*L. myriocarpa*, Nyl. L. P. 61!—*Buellia punctata*, Kbr. S. L. G. 229.

On rocks and stones, trunks of trees, old pales, etc. α.—On rocks near Ayton! Cleveland. β.—On the trunks of trees, very common in mountainous districts. The spermogones are not unfrequent. They are very minute, punctiform, immersed, or slightly prominent, solitary, black, irregularly scattered over the face of the thallus. The spermatia are numerous, cylindrical, curved, or undulated, ·003 in. long by ·00012 in. broad. These last organs shew very clearly that these forms are quite distinct, from all the states of *B. disciformis*.

9. BUELLIA NIGRITULA, (*Nyl.*) Thallus effuse, very thin, smooth, eventually somewhat leprous, white. Apothecia very minute, scattered, sessile; disc black, plane or convex; margin thin, soon obliterated; paraphyses rather lax; asci narrow, clavate, 8 spored; spores minute oblong or ovate, bilocular, often slightly constricted in the middle, pale green, or greenish-brown; ·00175 to ·00225 in. long, by ·00075 in. broad.

Lecidea nigritula, Nyl. in Bot. Notis. 1853. p. 99, L. P. 62! Enum. Gen. 126.—*Buellia Schæreri,* Massal. Ric. 81. fig. 166—*L. microspora,* Hepp Eur. 43!

On the trunks of trees, especially scotch firs, but not common. Farndale! Yorkshire. This species closely resembles the variety *punctiformis* of the preceding one, both in its habit and external appearance. It is distinguished chiefly by its spores, which are much smaller in size, and usually of a paler colour. Their spermogones and their spermatia are similar.

GENUS 19. DIPLOTOMMA, (*Fw.*)

Apothecia open, patellæform, margined by a subcarbonaceous proper exciple, and an accessory subevanescent thallodal one, often becoming subimmarginate; thalamium arising from a thick brownish-black grumous simple hypothecium; asci ventricoso-clavate, 8 spored; spores ellipsoid, oblong, or ovate-oblong, quadrilocular, or irregularly muriform-multilocular, varying in colour from pale yellow to dark reddish-brown. Thallus crustaceous, uniform; hypothallus indistinct.

The present genus is closely allied to *Rhizocarpon.* It is distinguished from it, by the double or compound exciple, grumous hypothecium, and indistinct hypothallus.

1. DIPLOTOMMA ALBOATRUM, (*Hoffm.*) Thallus subcartilaginous, areolato-verrucose, rimulose, uneven, white, or glaucous-white, often tartareo-farinose. Apothecia small, very numerous, crowded, at first innate, afterwards sessile; disc when young plane, black, cæsio-pruinose, surrounded by a thallodal margin, and a thin proper one, subsequently convex, naked, and immarginate; hypothecium pale reddish-brown; paraphyses rather lax, yellowish-brown when viewed in masses; asci ventricoso-clavate, 8 spored; spores oblong, or elliptical-oblong, at times slightly curved, quadrilocular, or irregularly muriform-multilocular, brown, or dark reddish-brown; ·003 to ·004 in. long, by ·00125 to ·002 in. broad. PLATE 4, *fig.* 82.

Verrucaria alboatra, Hoffm.—*Lichen corticola,* Sm. E. Bot. 1892.—*Lecidea alboatra,* Fries. L. Ref. 336.—Hook. Brit. Fl. 2. 180.—Hepp Eur. 148!—Nyl. Enum, Gen. 126, L. P. 63!—Schær. Enum. 122, L. H. 445!—Leight. Exs. 64!—*Diplotomma alboatrum,* β. Massal. Ric. 98. fig. 200.—α. Kbr. S. L. G. 218.

β. TRABINELLUM, (*Fw.*) Thallus areolato-verrucose, unequal, dull white. Apothecia crowded, often confluent; disc black, cæsio-pruinose, hemispherical, immarginate.

Lecidea epipolia, var. *trabinella,* Flotow.—*L. alboatra,* var. *trabinella,* Fries L. Ref. 337.—Schær. Enum. 122.—Hepp Eur. 29!

γ. POPULORUM, (*Massal.*) Thallus suborbicular, tartareous, areolato-verrucose, rugulose, greyish-white. Apothecia at first immersed, afterwards sessile; disc black, naked, plane, or tumid; thallodal margin prominent when young, subsequently evanescent, proper margin very thin, entire, black; spores as above.

Diplotomma populorum, Massal. Ric. 99. fig. 201.—*Lecidea alboatra,* var. *populorum,* Nyl. Enum. Gen. 126, L. P. 65!

δ. EPIPOLIUM, (*Ach.*) Thallus subdeterminate, tartareo-farinose, subrimulose, white. Apothecia very numerous, more or less crowded, innato-sessile; disc black, cæsio-pruinose, when young plane and surrounded by a white thallodal margin, when old, convex and immarginate; spores as above.

Lichen epipolius, Ach.—Sm. E. Bot. 1137.—*Lecidea alboatra*, c. *saxicola*, Fries L. Ref. 337.—Leight. Exs. 241 !—Hook. Brit. Fl. 2. 180. —*L. calcarea*, var. *margaritacea*, and *L. alboatra*, var. *epipolia*, Schær. Enum. 121. 122, L. H. 230 ! 580 !—*L. alboatra*, var. *epipolia*, Nyl. Enum. Gen. 126, L. P. 64 !—*L. epipolia*, Hepp Eur. 146 !—*Diplotomma alboatrum*, Massal. Ric. 98.

On the trunks of trees, old pales, rocks, &c. α. and β.—Common on the trunks of trees and old pales in limestone districts. γ.—On *Populus tremula*, near Easby ! and Carlton ! Cleveland. δ.—On old walls and rocks, frequent. The spermogones are occasionally present, They are very minute, erumpent, punctiform, dark-brown, or nearly black, sparingly scattered over the face of the thallus. The spermatia are straight, cylindrical, ·00175 to ·002 in. long, by ·00012 in. broad.

2. DIPLOTOMMA CALCAREUM, (*Weis.*) Thallus determinate, tartareo-farinose, rimulose in the centre, subeffigurate at the circumference, white, or bluish-white. Apothecia black, rather large, or of a medium size, numerous, when young innate, slightly pruinose, plane, surrounded by a white thallodal margin, when old sessile, naked, and somewhat difformed, thallodal margin evanescent; proper one, black, subpersistent; hypothecium brownish-black; paraphyses conglutinate, yellowish-brown when viewed in masses; asci large ventricoso-clavate, 8 spored; spores oblong, elliptical-oblong, or ovate, irregularly muriform-multilocular, subhyaline, or pale yellowish-green; ·005 to ·008 in. long, by ·0025 to ·00375 in. broad.

Lichen calcarius, Weis,—*L. rimosus*, Sm. E. Bot. 1736.—*Lecidea contigua*, var. *calcarea*, Fries L. Ref. 302.—*L. speirea*, Hook. Brit. Fl. 2. 180.—*L. calcarea*, α. *Weisii*, Schær. Enum. 121, L. H. 184 ! in pt. —*L. calcarea*, Hepp Eur. 147 !—*Diplotomma Weisii*, Massal. Ric. 99. fig. 202.—*D. calcareum*, Kbr. S. L. G. 220.

On rocks and stones, chiefly in limestone districts. Teesdale ! Durham, *Rev. J. Harriman*. Penhill ! Yorkshire, *I. G. Baker, Esq.* Co. Antrim; Ireland, *D. Moore, Esq.* Carlton Bank ! Cleveland. Distinguished from the preceding by its thicker and smoother thallus, flat and larger apothecia, larger and paler coloured spores ; from all the states of *Rhizocarpon petræum*, by its tartareo-farinose thallus, accessory thallodal margin, and large pale spores. A minute parasite often occurs on its thallus ; it is hereafter described as a *Microthelia*.

GENUS 20. RHIZOCARPON, (*Ramond.*)

Apothecia open, patellæform, margined by a celluloso-subcarbonaceous cupular proper exciple ; thalamium arising from a brownish-black carbonaceous simple hypothecium ; asci clavate, or clavato-ventricose, 1, 2, or 8 spored ; spores elliptical-oblong, oblong, or ovate, irregularly muriform-multilocular, varying in colour from pale yellow to dark green, or brown. Thallus crustaceous, uniform ; hypothallus black, generally very distinct.

1. RHIZOCARPON MONTAGNEI, (*Fw.*) Thallus subtartareous, effuse,

areolate, greyish-brown; areolæ tumid, angular, more or less crowded; hypothallus thin, black. Apothecia small, numerous, irregularly scattered, level with the thallus, or slightly raised above its surface; disc black, naked, plane, or tumid; margin thin, soon disappearing; hypothecium reddish-brown; paraphyses very fine and delicate, somewhat diffluent; asci oblongo-clavate, one spored; spores large, oblong, or elliptical, muriform-multilocular, varying in colour from pale yellow to dark green; ·008 to ·012 in. long, by ·004 to ·006 in. broad.

Lecidea Montagnei, Flotow.—Hepp Eur. 309!—*Lecidea atroalba*, Fries L. Ref. 310 in pt.—*L. confervoides*, var. *atroalba*, Schær. Enum. 113, L. H. 443! in pt.—*Rhizocarpon confervoides*, Massal. Ric. 101, fig. 205.—*R. Montagnei*, Kbr. S. L. G. 258.—*L. dispora*, Hepp Eur. 28! in pt.

On rocks in alpine districts. Lancashire! *Mr. R. Jacob.* This bears considerable resemblance to states of *petræum* (and *geminatum*, a species having two spores in each ascus, but which, I believe, has not yet been observed in Great Britain), and unless its asci and spores are examined, it is in danger of being confused with them; however, if due attention be paid to these organs, they will always identify it, as their characters are remarkably constant.

2. RHIZOCARPON PETRÆUM, (*Wulff.*) Thallus subdeterminate, or effuse, subtartareous, areolate, greyish-white, grey, pale brown, or brown; areolæ plane, or tumid, scattered, or crowded; hypothallus thin, black, often extended beyond the region of the thallus. Apothecia small, numerous, more or less crowded, and at times angular-difformed, subsessile; disc black, naked, plane, surrounded by a thin entire margin, which eventually disappears; hypothecium rather thick, brownish-black; paraphyses pale, diffluent; asci ventricoso-clavate, 8 spored; spores elliptical-oblong, or ovate, irregularly muriform-multilocular, often slightly constricted opposite the dissepements, pale yellow, or greenish-brown; ·0045 to ·007 in. long, by ·002 to ·003 in. broad.

Lichen petræus, Wulff.—*Lecidea petræa*, Flot.—Leight. Exs. 159!—Nyl. Enum. Gen. 125.—*Lichen atroalbus*, Sm. E. Bot. 2336.—*Lecidea atroalba*, Hook. Brit. Fl. 2, 174.—Fries L. Ref. 310 in pt.—Hepp Eur. 36! and 37!—*L. confervoides*, varr. *areolata*, and *atroalba*, Schær. Enum. 113, L. H. 443! in pt.—*Rhizocarpon petræum*, Massal. Ric. 102, fig. 206.—Kbr. S. L. G. 260.

β. LAVATUM, (*Fries.*) Thallus tartareous, very thin, subcontiguous, rimulose, dull, greyish-brown. Apothecia sessile; disc black, plane; margin thickish, obtuse, subpersistent.

Lecidea atroalba. δ. lavata, Fries. L. Ref. 313.

γ. CONCENTRICUM, (*Dav.*) Thallus determinate, orbicular, thin, tartareo-farinose, contiguous, or rimulose, dull white; hypothallus obliterated. Apothecia small, innate, usually disposed in a somewhat concentric manner; disc black, slightly depressed, or plane; margin rather thick, obtuse, subpersistent.

Lichen concentricus, Davies.—Sm. E. Bot. 246.—*Lecidea atroalba*, var. *subconcentrica*, Fries L. Ref. 313.—*L. petræa*, Hook. Brit. Fl. 2, 175.—Schær. Enum. 122, L. H. 183!—Hepp Eur. 149!—*Rhizocarpon petræum*, Massal. Ric. 102, fig. 206.—*Lecidea atroalba*, var. *concentrica*, Leight. Exs. 17!—Nyl. Enum. Gen. 125.

δ. OEDERI, (*Ach.*) Thallus effuse, thin, tartareous, rimuloso-areolate, rusty-red. Apothecia minute, numerous, scattered, sessile; disc black, plane, surrounded by a thinnish flexuose margin. Spores oblong, or ovate-oblong, constantly quadrilocular, slightly constricted opposite the dissepements, pale yellow, or hyaline; ·0035 to ·0045 in. long, by ·0015 in. broad.

Lecidea, Oederi, Ach. Meth. 49.—Leight. Exs. 187!—*L. atroalba,* var. *murina,* Fries S. V. Sc.—*Rhizocarpon petræum, β. Oederi,* Kbr. S. L. G. 260.

On rocks and stones in mountainous districts. α. β. and γ. not unfrequent. δ. Highlands of Scotland! *Admiral Jones.* Lounsdale! Cleveland. The spermogones are not of unfrequent occurrence. They are very minute, subpapillæform, or punctiform, more or less prominent, black, generally seated about the margins of the areolæ. The spermatia are very fine and delicate, cylindrical, or subacicular, straight, ·00125 in. long, by ·0008 in. broad.

3. RHIZOCARPON GEOGRAPHICUM, (*L.*) Thallus tartareous, areolate, smooth, bright greenish-yellow; areolæ more or less distinct, plane, or tumid; hypothallus black. Apothecia produced from the hypothallus, small, numerous, often confluent and angular-difformed; disc plane, black, surrounded by a very thin margin; paraphyses capillary, diffluent; asci large, subclavate, 8 spored; spores elliptical-oblong, ovate, or subpyriform, irregularly muriform-multilocular, varying in colour from pale green to dark olive-green; ·005 to ·007 in. long, by ·0025 to ·003 in. broad. PLATE 4, *fig.* 83.

Lichen geographicus, L. and Auct.

α. ATROVIRENS, (*Fries.*) Thallus as above.

Lecidea geographica, a. *atrovirens,* Fries L. Ref. 327.—*Lichen geographicus,* Sm. E. Bot. 245 in pt.—*L. geographica,* Hook. Brit. Fl. 2, 178 in pt.—*L. geographica, β. atrovirens,* Schær. Enum. 106.—Hepp Eur. 153! and 324!—Leight. Exs. 128!—*Rhizocarpon geographicum,* α. Kbr. S. L. G. 262.

β. CONTIGUUM, (*Fries.*) Thallus subdeterminate, contiguous at the circumference, rimose in the centre, smooth, bright greenish-yellow. Apothecia imbedded in the thallus. Otherwise as above.

Lecidea geographica, b. *contigua,* Fries L. Ref. 327.—Schær. Enum. 106, L. H. 172!—Hepp Eur. 152! and 325!—*L. geographicus,* Sm. E. Bot. 245 in pt.—*L. geographica,* Hook. Brit. Fl. 2, 178 in pt.—*L. geographica,* var. *alpicola,* Leight. Exs. 129!—*Rhizocarpon geographicum, α. contiguum,* Massal. Ric. 100, fig. 203.

γ. URCEOLATUM, (*Schær.*) Thallus smooth, areolate, bright greenish-yellow. Apothecia small, orbicular; disc urceolate, black, surrounded by a thick smooth margin.

Lecidea geographica, var. *urceolata,* Schær. Enum. 106.—*Rhizocarpon geographicum,* var. *urceolatum,* Kbr. S. L. G. 263.

δ. SPHÆRICUM, (*Schær.*) Thallus indeterminate, verrucoso-areolate, greenish-yellow; areolæ distinct, smooth, tumid; hypothallus black, obscure. Apothecia small, elevated above the level of the areolæ; disc black, convex, immarginate; spores as in the normal form.

Lecidea geographica, var. *sphærica,* Schær. Enum. 106.—Leight. Exs. 93!

On rocks and stones in subalpine and alpine districts; common. This is one of the most elegant of the crustaceous lichens. It may be recognised at first sight, by its bright greenish-yellow thallus, and black hypothallus. The spermogones are occasionally present; they are very minute, subverrucæform, semi-immersed, black, isolated and scattered, or crowded, and at times confluent, chiefly distributed towards the circumference of the thallus, or near the margins of the areolæ. The spermatia are straight, cylindrical, ·00125 in. long, by ·00012 in. broad.

GENUS 21. SCHISMATOMMA, (*Fw.* and *Massal.*)

Apothecia open from the first, patellæform, pruinose, margined by a cupular carbonaceous proper exciple; thalamium arising from a thinnish carbonaceous simple hypothecium; asci clavate, or elongato-clavate, 8 spored; spores fusiform or acicular, 4 or 6 locular, uncoloured. Thallus crustaceous uniform.

1. SCHISMATOMMA PREMNEUM, (*Ach.*) Thallus effuse, very thin, submembranaceous, smooth, or slightly rugulose, grey, at times tinged with red. Apothecia small, scattered, sessile; disc plane, black, cinereo-pruinose; margin entire, prominent, at length flexuose; hypothecium thin, more or less incorporated with the excipulum; paraphyses lax, pale; asci clavate, 8 spored; spores obtusely fusiform, straight, or slightly curved, 6-locular, subhyaline, or hyaline; ·0045 to ·005 in. long, by ·001 in. broad.

Lecidea premnea, Ach. Syn. 17 in pt.—Nyl. Enum. Gen. 126.—*Lichen abietinus*, Sm. E. Bot. 1682.—Hook. Brit. Fl. 2, 179.—Leight. Exs. 124! Brit. Angi. Lich. pl. 28, fig. 3.

β. SAXICOLUM, (*Leight.*) Thallus effuse, thin, at first smooth and even, subsequently granuloso-leprous, greyish-green. Apothecia small, scattered, or crowded, sessile; disc plane, black, pale green-pruinose; margin thin, flexuose. Spores as above.

Lecidea premnea, var. *saxicola*, Leight. Exs. 185!—Nyl. L. P. 67!

On the trunks of old trees, and on shaded rocks. α.—On trees. Haughmond Hill! Shropshire, *Rev. W. A. Leighton*. Near Bristol! *Miss M. Atwood*. Castlebernard Park! Ireland, *I. Carroll, Esq.* Kildale! and Hoggarts Wood! Ingleby, Cleveland. β.—On rocks. Airyholme Wood, near Ayton! The spermogones are occasionally present. They are very minute, subpapillæform, slightly prominent, dark-brown, or black, scattered over the whole face of the thallus. The spermatia are very abundant, issuing in a long continued stream, short, ellipsoid; ·00025 to ·0005 in. long, by ·00012 in. broad.

2. SCHISMATOMMA AMYLACEUM, (*Ehrh.*) Thallus effuse, leproso-pulverulent, greyish-white, or cream-coloured. Apothecia small, subimmersed; disc plane, black, cæsio-pruinose, surrounded by a thin prominent margin, eventually convex, angular, and subimmarginate; asci subclavate, 8 spored; spores subacicular, or clavato-fusiform, quadrilocular, hyaline; ·005 to ·006 in. long, by ·001 in. broad. PLATE 4, *fig.* 84.

Lichen amylaceum, Ehrh.—*Lecidea alboatra*, α. *amylacea*, Schær. Enum. 122, L. H. 627!—*Schismatomma amylaceum*, Massal. Ric. 56, fig. 103.—*Lecanactis illecebrosa*, Kbr. S. L. G. 277.—*Lecidea amylacea*, Nyl. Enum. Gen. 126 in pt.

β. CANDIDUM, (*Sm.*) Thallus effuse, thickish, subtartareous, verruculose or rimoso-areolate, smooth, cream-coloured, often tinged with rose, subsequently granuloso-pulverulent, greyish-white. Apothecia small, crowded, appressed; disc black, cæsio-pruinose, plane, surrounded by a thin even or flexuose margin, eventually more or less convex and angular-difformed; hypothecium thick, brownish-black; paraphyses conglutinate, yellowish-brown when viewed in masses; asci elongato-clavate, 8 spored; spores as above.

Lichen candidus, Sm. E. Bot. 1138.—*Lecidea alboatra*, var. *epipolia*, Schær. Enum. 122 in pt.—*Schismatomma epipolium*, Massal. Ric. 57, fig. 106.—*Lecanactis Dilleniana*, Kbr. S. L. G. 276.—*Lecidea amylacea*, Auct. in pt.—Leight. Exs. 336!

α.—On the trunks of trees in mountainous districts. β.—On rocks. Aviemore! *Admiral Jones*. On the walls of Ingleby Park! Cleveland. This variety appears to have been confounded by *Schærer*, with *Diplotomma alboatrum*, var. *epipolium;* it bears a strong resemblance to it, both in its mode of growth and external appearance, but its spores show that it is quite distinct. I have not seen any British specimens of the corticole state or normal form. The spermogones of the saxicole state are occasionally present. They are visible to the eye as minute greyish-black verrucæ, and are scattered indiscriminately over the whole face of the thallus, but chiefly on such specimens as are nearly destitute of apothecia. The spermatia are usually very numerous, cylindrical, straight, ·001 in. long, by ·00012 in. broad.

3. SCHISMATOMMA ABIETINUM, (*Ach*,) Thallus effuse, thin, smooth, glaucous-white, subsequently leprous or slightly pulverulent. Apothecia rather large, scattered, often very numerous and much crowded, sessile; disc plane, black, densely white or subtestaceo-pruinose, surrounded by a prominent even or flexuose margin; hypothecium thick, brownish-black; paraphyses conglutinate, pale; asci elongato-clavate, 6-8 spored; spores acicular, or subfusiform, quadrilocular, subhyaline, or hyaline; ·007 to ·008 in. long, by ·001 in. broad.

Lichen abietinus, Ach.—*Pyrenothea leucocephala*, et *. *Lecidina*, Fries L. Ref. 454.—*Verrucaria leucocephala*. Borr. in E. Bot. Suppl. 2642. fig. 2. a. b. c.—Hook. Brit. Fl. 2. 152.—*Pyrenothea leucocephala*, Leight. Brit. Angi. Lich. 65, pl. 28. fig. 1. (Spermogones and spermatia) and 2 (Apothecium and spores). Exs. 163! and 164!—Massal. Ric. 152, fig. 297 (spermogones), and *Schismatomma abietinum*, Massal. Ric. 56, fig. 102.—*Lecidea leucocephala*, c. *lecidina*, and d. *denudata*, Schær. Enum. 131, L. H. 534! and 535!—*Lecanactis abietina*, Kbr. S. L. G. 276.—*Lecidea abietina*, Nyl. Enum. Gen. 126.

On the trunks of trees in mountainous districts; frequent. The spermogones are constantly present. They are verrucæform, visible to the naked eye, prominent, concolorous with the thallus, and are indiscriminately scattered over its surface; receptacle and ostiolum dark-brown or black. The spermatia are tolerably numerous, very large, subfusiform, straight, or slightly curved, ·0025 to ·003 in. long, by ·0005 to ·00075 in. broad. *Verrucaria leucocephala*, Borr. and *Pyrenothea leucocephala* of Auct. are simply the spermogoniferous states of the present species. Indeed the whole of the reputed species, constituting the genus *Pyrenothea*, are only spermogoniferous states of other crustaceous lichens

GENUS 22. DACTYLOSPORA, (*Kbr.*)

Apothecia at first nearly closed, punctiform, becoming patellæform, margined by a black cellulose cupular proper exciple; thalamium arising from a grumous simple hypothecium; asci subclavate, 8 spored; spores linear-oblong, quadrilocular, coloured. Thallus none; species athalline; parasitic on the thallus of various crustaceous lichens.

1. Dactylospora inspersa, (*Tul.*) Apothecia minute, parasitic on the thallus of *Pertusaria communis*, and *Lecanora Turneri*, subinnate, or sessile; disc plane, black, surrounded by a thin slightly elevated margin; hypothecium thin, reddish-brown, grumous; asci clavate, 8 spored; spores linear-oblong, or ellipsoid, quadrilocular, reddish-brown; ·003 in. long, by ·001 in. broad. Plate 4, *fig.* 85.

Lecidea inspersa, Tul.—Leight. Exs. 183!—*Calicium stigonellum,* Salwey in Trans. Edin. Bot. Soc. 2, 204.—*Lecidea parasitica,* Schær. Enum. 136.—*Dactylospora Florkei,* Kbr. S. L. G. 271.

On the trunks of trees, parasitic on the thallus of *Pertusaria communis* and *Lecanora Turneri.* Barmouth! *Rev. T. Salwey.* Near Exeter! Devonshire, *Mr. E. Parfitt.* Cliffrigg! and Easby Wood! Cleveland. This species bears considerable resemblance to *Acolium stigonellum,* in its habit and external appearance. It may be known by its quadrilocular spores.

Genus 23. Abrothallus, (*De Not.*)

Apothecia open from the first, subdisciform, becoming hemispherico-capituliform, immarginate; thalamium arising from an olivaceous, or brownish-grumous simple hypothecium; asci clavate, or obovate, 8 spored; spores ovato-oblong, or elliptical-oblong, bilocular, or irregularly unilocular, varying in colour from pale yellow to olive-green, or brown. Thallus none; speices athalline; parasitic on the thallus of various foliaceous lichens.

1. Abrothallus. Smithii, *Tul.* Apothecia minute, scattered, erumpent, becoming subinnato-sessile on the alien thallus, pulviniform, or globose, black, naked, or green-pruinose, immarginate; hypothecium thin, greenish-brown; paraphyses conglutinate; asci clavate, 8 spored; spores ovate-oblong, bilocular, often slightly constricted in the middle, upper loculus broader and shorter than the lower one, olive-green, or reddish-brown; ·003 to ·0035 in. long, by ·00125 in. broad. Plate 4, *fig.* 86.

Abrothallus Smithii, and *A. Welwitzschii,* Tulasne Mem. Lich. in Ann. Sc. Nat. Ser. 3, 115.—*A. Welwitzschii,* and *A. Smithii,* var. *ater,* and *A. Smithii,* var. *pulverulentus,* Leight. Exs, 191! 309! 310!—*A. Bertianus,* and *A. Buellianus,* Massal. Ric 88 .fig. 180. 181.—*A. Smithii,* Kbr. S. L. G. 215.—*A. Smithii,* var. *ater,* and *pulverulentus,* Linds. Monog. Abroth. 8. Pl. 4. figs. 1-14.—*Endocarpon parasiticum,* Ach. Syn. 100.

Parasitic on the thallus of various foliaceous lichens. On *Sticta fuliginosa,* Rocks, New Cut! Meadfort, Torquay, Devonshire, ex. herb. *Rev W. A. Leighton.* On furfuraceous states of *Parmilia saxatilis,* on rocks and old walls, Craigie Hill! Perth., Craig-y-Barnes! and Strathbraan Road! Dunkeld, *Dr. Lindsay.* On *Parmelia caperata,* on trees, Blarney! Co. Cork, *I. Carroll, Esq.* On *Parmelia olivacea,* on ash-trees in the south-west corner of Ingleby Park! Cleveland, Yorkshire. The organs designated *Pycnides* are of frequent occurrence in this species. They are of an intermediate size, scattered, intermixed with the apothecia, immersed in the alien thallus; ostiole black, irregularly stellato-fissured. Sterigmata short, stout, simple. Stylospores irregularly obovate, unilocular, filled with a pale oily protoplasm; ·00125 to ·00175 in. long, by ·001 in. broad. I have never met with spermogones.

2. Abrothallus oxysporus, *(Tul.)* Apothecia minute, crowded, more or less immersed in the alien thallus, subdisciform, brownish-black, immarginate; hypothecium yellowish-brown; paraphyses conglutinate; asci obovato-clavate, 8 spored; spores elliptical, more or less acute at the extremities, unilocular, each usually containing two globular nuclei, pale yellow; ·00325 to ·004 in. long, by ·001 to ·00125 in. broad.

Abrothallus oxysporus, Talasne Mem.—Linds. Monog. Abroth. 11. pl. 4 figs. 15. 16.

Parasitic on furfuraceous states of *Parmelia saxatilis*, *P. conspersa*, and *Cetraria glauca*. Strathbraan Road! Dunkeld, Corramulzie! Braemar. Glenshee! and Moncrieff Hill! Perth, *Dr. Lindsay*. This species may be readily known from the preceding, by its less scattered and more immersed apothecia, unilocular and paler coloured spores. I have not seen the spermogones of this species myself, but *Dr. Lindsay* has met with them frequently and in various localities. They are both described and figured by him in his *"Monograph of the genus Abrothallus,"* and I would refer those desirous of becoming thoroughly acquainted with either the genus in question, or the spermogones in general, to the monograph just mentioned, and to his *"Memoir on the Spermogones and Pycnides of filamentose, fruticulose, and foliaceous lichens."*

Tribe 8. Xylographidaceæ, (*Nyl.*)

Thallus crustaceous, uniform. Apothecia pseudo-lirellæform; thalamium contained in a cupular carbonaceous exciple.

This tribe seems to be an intermediate link, connecting *Lecideaceæ* with *Graphidaceæ*, approaching the first in the form and internal organization of the spores, and the last in the external appearance of the apothecia. All the British representatives of it, have been usually regarded as *Opegraphæ;* there can however be little doubt but that this is their most appropriate position.

Genus 1. Lithographa, (*Nyl.*)

Apothecia at first closed, pseudo-lirellæform, oblong, rounded at the extremities, subinnate, margined by an inflexed carbonaceous proper exciple; thalamium arising from a carbonaceous simple hypothecium; asci oblongo-clavate, 8 spored; spores oblong, unilocular, hyaline. Thallus crustaceous, tessellato-areolate, uniform; hypothallus brownish-black.

The principal distinguishing characters of this genus, as here defined, are the tessellated thallus, the form of the apothecia, and the unilocular uncoloured spores.

1. Lithographa tesserata, *(DC.)* Thallus thickish, tartareous,

tessellato-areolate, greyish-brown, more or less tinged with red; hypothallus thin, black. Apothecia solitary, or grouped, subsessile, dull-black, oblongo-obtuse, short, simple, or slightly divided; margin thick, convex, inflexed; asci oblongo-clavate, 8 spored; spores oblong, unilocular, hyaline; ·002 in. long, by ·001 in. broad. PLATE 4, *fig.* 87.

Opegrapha tesserata, DC. Flor. Franc. 2, 213.—Borr. in E. Bot. Suppl. 2632, fig. 2.—Hook. Brit. Fl. 2, 146.—Leight. Graph. 8, pl. 5, fig. 1.—*O. petræa*, Ach. Syn. 72.—Fries. L. Ref. 362.—*O. saxatilis*, *β. tesserata*, Schær. Enum. 159.

On rocks in mountainous districts; very rare. Holwick Scar! Teesdale, on the Yorkshire side of the river, *Rev. J. Harriman.*

GENUS 2. MELANOSPORA, *Mudd.*

Apothecia at first closed, pseudo-lirellæform, rotundato-difformed, subinnato-sessile, margined by an inflexed carbonaceous proper exciple; thalamium arising from a brownish-black carbonaceous simple hypothecium; asci broadly clavate, 8 spored; spores linear-oblong, or elliptical, bilocular, of a dark-brown or nearly black colour. Thallus crustaceous, uniform.

This genus is distinguished from the preceding one, by the internal organization and colour of the spores, and from *Buellia* by the form of the apothecia.

1. MELANOSPORA CEREBRINA, *(DC.)* Thallus subdeterminate, thickish, tartareous, contiguous, chalky-white. Apothecia black, innato-sessile, scattered or congregated together into little groups which occasionally become confluent, oblong, suborbicular, angular, or subpatellæform; margin inflexed, convex, subpersistent; asci clavate, 8 spored; spores linear-oblong, bilocular, often slightly constricted in the middle, dark-brown, or nearly black; ·0035 to ·004 in. long, by ·00125 to ·0015 in. broad. PLATE 4, *fig.* 88.

Opegrapha cerebrina, DC. Flor. Franc. 3. 312.—Borr. in E. Bot. Supple. 2632. fig. 1.—Fries L. Ref. 363.—Hook. Brit. Fl. 2. 146.—Leight. Graph. 8. pl. 5. fig. 2.—*Lecidea cerebrina*, Schær. Enum. 159.

On calcareous rocks in mountainous districts. Teesdale! Durham, *Rev. J. Harriman.* Ingleborough! *Dr. Carrington.* Penhill! *I. G. Baker, Esq.* This species may be known by its white chalky-looking thallus, rotundato-difformed apothecia, and nearly black spores.

GENUS 3. STICTOGRAPHA, *Mudd.*

Apothecia at first closed, punctiform, becoming linear-oblong, or lirellæform, sessile; margined by an incurved carbonaceous proper exciple; thalamium arising from a carbonaceous simple hypothecium; asci obovato-clavate, 8 spored; spores irregularly obovate, or oblong, bilocular, coloured. Thallus crustaceous, uniform; hypothallus brownish-black.

Distinguished from *Melanospora* by the form of the apothecia, and colour of the spores.

1. STICTOGRAPHA LENTIGNOSA, (*Lyell.*) Thallus thin, tartareous, smooth, cream-coloured; hypothallus thin, brownish-black, usually

presented as a narrow undulated line at the circumference of the thallus. Apothecia sessile, black, very minute, scattered, punctiform, oblong or linear, straight, simple; margin incurved, tumid; asci clavate, 8 spored; spores irregularly obovate, unequally bilocular, pale brown; ·0025 to ·003 in. long, by ·001 to ·00125 in. broad. PLATE 4, *fig.* 89.

Opegrapha lentiginosa, Lyell M. S.—Leight. Graph. 26. pl. 6, fig. 16.—Nyl. Enum. Gen. 131.

On beech and holly in the New Forest, Hants.! Mr. Lyell, ex herb. *Rev. W. A. Leighton.* This is a very distinct species. It may be known from all the *Opegraphæ,* by the internal organization, colour, and peculiar form of its spores.

TRIBE 9. GRAPHIDACEÆ, (*Eschw.*)

Thallus crustaceous, uniform. Apothecia lirellæform, simple or substellate, or maculæform, or punctiform; disc rimæform, canaliculate, or plane, margined by a carbonaceous proper exciple, a carbonaceous proper exciple and an accessory thallodal one, or altogether immarginate.

SUBTRIBE 1. GRAPHIDEÆ.

Apothecia lirellæform, simple, or substellate, margined by a simple carbonaceons proper exciple, or by a compound one; disc rimæform, or canaliculate.

GENUS 1. OPEGRAPHA, (*Humb.*)

Apothecia lirellæform, simple, or divided, sessile; disc rimæform, or canaliculate; thalamium arising from a brownish-black carbonaceous, simple hypothecium; asci clavate, or oblongo-clavate, 8 spored; spores linear-oblong, subclavato-fusiform, fusiform, or acicular, 4 to 14 locular, subhyaline, or hyaline. Thallus crustaceous or membranaceous, uniform; hypothallus various, sometimes wanting.

SECT. A.—*Saxicolæ.*

1. OPEGRAPHA SAXATILIS, *D C.* Thallus effuse, very variable in thickness, pulverulent, greyish, or chalky-white, sometimes altogether obliterated. Apothecia variously elongated, black, rigid, sessile, simple or divided, scattered or confluent and crowded, straight or undulated; disc at first closed, subsequently more or less expanded, naked, or grey-pruinose; margin thickish and elevated when young, afterwards thinner and on a level with the disc; asci clavate, 6-8 spored; spores obtusely or subclavato-fusiform, 6-8 locular, the central loculus larger than the others, hyaline; ·005 to ·006 in. long, by ·001 to ·00125 in. broad.

Opegrapha saxatilis, DC Flor. Franc. 2, 312.—Fries L. Ref. 366.—Hook. Brit. Fl. 2, 145 in pt.—Leight. Graph. 9. pl. 5. fig. 3. Exs. 242!—*O. calcarea,* Turn. E. Bot. 1790.—*O. varia,* var. *calcarea,* Schær. Enum, 158.—Nyl. Enum. Gen. 131.—*O. saxatilis,* α. and β. Kbr. S. L. G. 281.

On rocks and stones, but chiefly such as are calcareous. Great Orme's Head! Caernarvonshire, *Rev. W. A. Leighton.* Blarney! Ireland, *I. Carroll, Esq.* Newton Wood! Cleveland, Yorkshire. The size and internal organization of the spores of this species, if due attention be paid to them, will always prevent its confusion with *Chevallieri;* and its place of growth with *varia.*

2. Opegrapha Chevallieri, (*Leight.*) Thallus effuse, thin contiguous, or minutely rimoso-areolate, smooth, or subleproso-rugulose, white, or greyish-white, very often entirely obliterated. Apothecia sessile, black, variable in size, linear, simple, curved, flexuose, or straight, scattered, or crowded and grouped together, becoming confluent and eventually forming black plicate masses; disc closed when young, subsequently slightly expanded, of an equal width throughout; margin tumid, round and incurved; asci clavate, 6-8 spored; spores oblongo-obovate or subclavate, quadrilocular, hyaline; ·003 in. long, by ·00075 to ·001 in. broad.

Opegrapha Chevallieri, Leight. Graph. 10, pl. 5. fig. 4. Exs. 67!—*O. lithyrga,* Chev. Hist. des Graph. 54. t. 11, fig. 4. 5. (fide Leight.)—Kbr. S. L. G. 281 in pt.—*O. saxatilis,* Hook. Brit. Fl. 2, 145 in pt.—*O. atra,* var. *lithyrga,* Schær. Enum. 154.—*O. atra,* var. *steriza,* Nyl. L. P. 144!

On rocks in mountainous districts. Great Orme's Head! Caernarvonshire, *Rev. W. A. Leighton.* Co. Antrim! Ireland, *Dr. Taylor.* Blarney! and near Cork! *I. Carroll, Esq.* Malham Cove! *Dr. Carrington.* Near Newcastle on Tyne! *Mr. W. Lisle.* Rokeby! Durham. Near Whitby! Broughton Bank! and in Newton Wood! all in Cleveland, Yorkshire. The spermogones are not of common occurrence; they are present on the specimens from near Newcastle, and are presented to the eye as minute flattish subimmersed brownish-black verrucæ; they are irregularly scattered over the whole thallus, but most abundant towards its circumference, or on such parts of it as are nearly destitute of apothecia. The spermatia in well developed spermogones are exceedingly numerous, straight, subcylindrico-acicular, ·001 in. long, by ·00012 in. broad; in immature ones they adhere very tenaciously to their sterigmata, giving them a very bristly and formidable appearance. The spermogones and the spermatia of these specimens somewhat resemble those of *O. lithyrga,* Hepp. Eur. 348! but they are not identical.

3. Opegrapha rupestris, (*Pers.*) Thallus effuse, thin, leprous, greyish-white, sometimes tinged with rose; often obliterated. Apothecia brownish-black, scattered, variable in size, usually short, oblong, ovate, or rotund, their extremities generally obtuse, simple, straight, or variously difformed; disc closed when young, subsequently slightly expanded, very narrow, rimæform; margin tumid, rounded and incurved, persistent; asci clavate, 6 or 8 spored; spores oblongo-ovate, or subclavate, quadrilocular, subhyaline, or hyaline; ·003 in. long, by ·00075 in. broad.

Opegrapha rupestris, Pers.—Fries L. Ref. 364.—Leight. Graph. 11, pl. 5. fig. 5. Exs. 243!—*O. Persoonii,* Ach. Meth. 17.—Sm. E. Bot. 2345.—Hepp. Eur. 346!—*O. saxatilis,* α. Schær. Enum. 159, (L. H. 94! in my copy.)—Hook. Brit. Fl. 2, 145 in pt.—*O. gyrocarpa,* Kbr. S. L. G. 280 in pt.—**O. rupestris,* Nyl. Enum. Gen. 131.

On rocks in mountainous districts. Llandudno! Caernarnonshire, *Rev. W. A. Leighton.* Dunkerron! Ireland, *Dr. Taylor.* Newton

Wood! and Pinchingthorp Wood! (sparingly) Cleveland, Yorkshire. This species is distinguished from *saxatilis*, by its smaller apothecia and quadrilocular spores; from *Chevallieri*, by its shorter and more difformed apothecia.

β. SAXIGENA, *(Tayl.)* Thallus effuse, leproso-tartareous, irregularly areolate, greyish-white, or of a yellowish rusty-brown colour. Apothecia brownish-black, sessile, scattered or congregated in groups, variable in size and form, generally simple, linear-oblong, or oblong, straight, slightly curved or flexuose; disc narrow; margin tumid, incurved, somewhat irregular; spores as in *rupestris*.

Opegrapha saxigena, Tayl. Fl. Hib. pt. 2, 259.—Leight. Graph. 13. pl. 5. fig. 7. Exs. 311!—*O. rupestris*, *β. saxigena*, Hepp. Eur. 347!

On rocks in shady or moist situations. Barmouth! North Wales, *Rev. W. A. Leighton.* Old Head of Kinsale! Ireland, *I. Carroll, Esq.* Co. Kerry! *D. Moore, Esq.* Bilsdale! Yorkshire, and Lounsdale! Cleveland. This is evidently only a variety of *rupestris*. It may be known by the colour of its thallus, and grouped apothecia. The spores are alike in both forms. The spermogones are present on specimens from the Co. Kerry. They are verrucæform, semi-immersed, black, irregularly scattered, intermixed with the apothecia. The spermatia are not very abundant, cylindrical or subellipsoid, straight, ·00075 to ·001 in. long, by ·00012 in. broad.

SECT. B.—*Corticolæ.*

4. OPEGRAPHA LYNCEA, *(Borr.)* Thallus effuse, tartareo-farinose, rimose, white. Apothecia black, innate when young, subsequently more or less emersed, very numerous, scattered over the whole face of the thallus, variable in size and form, orbicular, oval, oblong, or linear elongato-oblong, rounded and obtuse at both extremities, simple or occasionally somewhat divided, straight or slightly curved; disc broad, plane, rugose, cæsio-pruinose, eventually nearly or quite naked, surrounded by a more or less elevated rounded black margin; asci subclavate, 6-8 spored; spores fusiform or acicular, 6-8 locular, hyaline; ·006 to ·007 in. long, by ·00075 in. broad.

Lichen lynceus, Sm. E. Bot. 809.—*Opegrapha lyncea*, Borr. in Hook. Brit. Fl. 2, 144.—Schær. Enum. 158.—Nyl. Enum. Gen. 130, L. P. 71!—Hepp. Eur. 349!—*Lecanactis lyncea*, Eschw.—Fries L. Ref. 375.—Leight. Graph. 47. pl. 7, fig. 25. Exs. 195!—Kbr. S. L. G. 278.

On the trunks of old oaks. Near Bishop Auckland! Durham, *Rev. J. Harriman.* Haughmond Hill! Shropshire, *Rev. W. A. Leighton.* Near Thirsk! Yorkshire, *I. G. Baker, Esq.* Hoggarts Wood! Ingleby, Cleveland.

5. OPEGRAPHA VARIA, *(Pers.)* Thallus effuse, thinnish, pulverulent, white. Apothecia superficial, black, numerous, scattered or grouped, round, oblong, or linear-elongated, their extremities either rounded and obtuse, or attenuated and somewhat acute; disc canaliculate, or plane, of an equal width throughout, or dilated in the middle, naked or pruinose, surrounded by an inflexed tumid margin; asci obovato-clavate, 6-8 spored; spores obovate, or obovato-fusiform, quadrilocular or 6-locular, the central loculus usually larger than the others, subhyaline,

or hyaline; ·004 to ·006 in. long, by ·001 to ·00125 in. broad.

Opegrapha varia, Pers. in Ust. Ann. 7. 30.

a. *pulicaris,* (*Lightf.*) Thallus leproso-pulverulent, white, often tinged with red. Apothecia minute, scattered, sessile, oval, oblong, or elliptical, simple; disc equal throughout, or dilated in the middle; margin rounded and inflexed, persistent.

Lichen scriptus, β. pulicaris, Lightf.—*O. varia,* a. *pulicaris,* Fries L. Ref. 364.—Leight. Graph. 14. pl. 5. fig. 9.—*O. varia,* varr. *pulicaris,* and *phæa,* Schær. Enum. 156, L. H. 97! 518!—Hepp Eur. 166!—*O. vulvella,* Ach. Syn. 77.—Nyl. L. P. 73!

b. NOTHA, (*Ach.*) Apothecia black, very prominent, sessile, scattered or grouped, large, round, oblong, or linear-oblong, the extremities obtuse, simple; disc naked, broad, plane or convex; margin thin, eventually nearly obliterated.

Lichen nothus, Ach. Prod. 19.—*Opegrapha notha,* Sm. E. Bot. 1890.—*O. varia,* b. *notha,* Fries L. Ref. 364.—Leight. Graph. 15., Exs. 66!—*O. varia,* Hook. Brit. Fl. 2. 145 in pt.—*O. varia,* var. *lichenoides,* Schær. Enum. 156, L. H. 282!—Hepp Eur. 165!—*O. varia,* var. *notha.* Nyl. L. P. 75!

c. LUTESCENS, (*Ach.*) Apothecia black, prominent, small, scattered punctiform, rounded, oblong, or elliptical; disc broad, nearly plane, green-pruinose; margin thin, slightly elevated.

O. vulvella, var. *lutescens,* Ach. Syn. 77.—Nyl. L. P. 74! —*O. varia,* var. *chlorina,* Schar. Enum. 157, L. H. 519!

d. SIGNATA, *Fries.* Thallus greyish-white, usually tinged with red. Apothecia small, black, scattered or crowded, prominent, punctiform, oblong, or linear-oblong, simple, straight or slightly curved; disc plane, naked; margin somewhat elevated, inflexed, at length evanescent.

O. varia, var. *signata,* Fries L. Ref. 365.—Nyl. L. P. 76! and 77!—Schær. Enum. 157.

e. TIGRINA, (*Ach.*) Thallus effuse, thin, pulverulent, dirty-white, often evanescent. Apothecia black, slightly polished, sessile, prominent, scattered, or crowded in groups, linear-oblong, obtuse and rounded at the extremities, simple, straight or curved; disc rather broad, canaliculate, nearly the same width throughout; margin thickish, rounded and inflexed, persistent.

Opegrapha signata, β. tigrina, Ach. L. Univ. 262.—*O. diaphora,* Sm. E. Bot. 2280.—*O. varia,* var. *tigrina,* Schær. Enum. 157.—Leight. Graph. 16, Exs. 287!

f. TRIDENS, (*Ach.*) Thallus thickish, pulverulent, dirty-white. Apothecia black, large, sessile, prominent, elongato-oblong, slightly attenuated toward the extremities, or of an equal width throughout, usually arranged into conspicuous stellate groups; disc more or less expanded, canaliculate; margin elevated, rounded and inflexed, persistent.

Opegrapha tridens, a. Ach. L. Univ. 263.—*O. varia,* Hook. Brit. Fl. 2. 145 in pt.—*O. varia,* var. *tridens,* Schær. Enum. 158.—Leight. Graph. 16.

On the trunks of various trees, but most frequent on elms, oaks, and beeches; common. These varieties are all more or less connected by intermediate forms, and evidently owe their origin to local circumstances, or to atmospheric influences. Their spermogones are not of unfrequent occurrence; they are identical in all the forms. They are minute, generally visible to eye when unassisted, punctiform, more or less immersed, brownish-black, irregularly scattered over the face of the thallus, but most numerous on such parts of it as are nearly destitute of apothecia. The spermatia present some slight variations in the different forms; they are more or less abundant, straight, short, ellipsoid, or subcylindrical, ·00075 in. long, by ·00012 to ·00016 in. broad.

β. DIAPHORA, (*Ach.*) Thallus effuse, thin, at first smooth, membranaceous, subsequently pulverulent, white. Apothecia black, sessile, numerous, scattered or congregated close together, elongated, narrow, acuminated at both extremities, simple, straight, or curved and undulated; disc narrow, naked, plane; margin thin, inflexed, prominent; spores mostly quadrilocular; otherwise as in *O. varia.*

Lichen diaphorus, Ach. Prod. 20.—*Opegrapha varia*, d. *diaphora*, Fries L. Ref. 365.—Leight. Graph. 15. Exs. 220!—*O. varia*, var. *diaphora*, Schær. Enum. 157, L. H. 98!—*O. varia*, Hook. Brit. Fl. 2, 145 in pt.

On the trunks of ash, oak, and other trees. Ingleby Park! Airyholme Wood! and near Easby! Cleveland. This variety may be recognised by its narrow elongated apothecia, and by its spores, which are frequently only quadrilocular.

γ. RIMALIS, (*Fries*) Thallus effuse, very thin, membranaceous, smooth, white. Apothecia black, prominent, sessile, minute, scattered, linear-elongated, acuminated, or somewhat rounded at both extremities and of an equal width throughout, simple, straight, or flexuose; disc very narrow, canaliculate; margin thin, elevated and inflexed; spores linear-oblong, or obovate, mostly quadrilocular; otherwise as in *O. varia.*

Opegrapha varia, β. *rimalis*, Fries L. Ref. 365.—Schær. Enum. 157. —Leight. Exs. 192!

On the trunks of trees, especially elders; common. The spermogones are generally present. They are minute, punctiform, slightly prominent, black, solitary, scattered. The spermatia are very abundant, subcylindrical, straight, or very slightly curved, ·001 in. long, by ·00016 in. broad.

6. OPEGRAPHA TURNERI, *Leight.* Thallus subdeterminate, very thin, membranaceous, smooth, more or less shining, grey or greyish-white; hypothallus very thin, brown, usually presented as a narrow undulated line at the circumference of the thallus. Apothecia black, somewhat polished, minute, scattered, very prominent, sessile, slender, variable in length, linear, slightly attenuated towards each extremity, simple, straight, or slightly curved or undulated; disc very narrow, equal in width throughout; margin rounded and incurved, persistent; asci short, obovato-clavate, 8 spored; spores linear-obovate, quadrilocular, hyaline; ·004 in. long, by ·001 in. broad.

Opegrapha Turneri, Leight. Graph. 17, pl. 5. fig. 10.—*O. betulina*, Sm. E. Bot. 2281. (excl. syn.)—Hook. Brit. Fl. 2. 145, excl. syn.

On birch and hazel; not common. Castlebernard Park! Ireland, *I. Carroll, Esq.* On hazel, Cliffrigg! and Ingleby Park! Cleveland, Yorkshire. This species is closely allied to *O. varia*, var. *rimalis.* It may be distinguished from it by its thinner, smoother and more shining thallus, very narrow polished black apothecia, and by its shorter asci and slenderer spores.

7. OPEGRAPHA ATRA, *Pers.* Thallus effuse, or maculæform, membranaceous, smooth, greyish-white. Apothecia very black, sessile, depressed, densly crowded, irregularly scattered, or subparallel, simple, or confluent, curved and flexuose, variously elongated, oblong or linear-oblong; disc very narrow, rimæform, equal; margin thick, elevated and undulated, persistent; asci clavate, 6-8 spored; spores obovato-fusiform, or fusiform, quadrilocular, hyaline; ·003 to ·0035 in. long, by ·00075 in. broad.

Opegrapha atra, Pers. in Ust. Ann. Bot. st. 7. p. 30.—Fries L. Ref. 367 in pt.

a. DENIGRATA, *(Ach.)* Thallus suborbicular, very thin, greyish-white. Apothecia slightly polished, more or less crowded, scattered in a very irregular manner, linear, straight, curved, or flexuose, simple or divided; disc very narrow, rimæform, equal; margin thick, elevated, persistent.

Opegrapha denigrata, Ach. Meth, 27.—Sm. E. Bot. 1753 in pt.—*O. atra,* Hook. Brit. Fl. 2. 145 in pt.—Leight. Graph. 18. pl. 5. fig. 11 in pt.—*O. atra,* var. *denigrata,* Schær. Enum. 153, L. H. 461 !—Nyl. L. P. 143 !

b. PARALLELA, *Leight.* Apothecia linear-elongated, crowded, parallel, straight, or undulated; otherwise as above.

Opegrapha atra, Leight. Graph. 18 in pt., var. *parallela,* Exs. 245 !

c. NIGRITA, *Leight.* Apothecia very black, densly crowded and confluent, forming irregular black masses.

Opegrapha atra, Leight. Graph. 18 in pt., var. *nigrita,* Exs. 193 !

d. ARTHONOIDEA, Leight. Apothecia variously difformed, crowded and confluent, forming irregular substellated groups or masses.

Opegrapha atra, var. *arthonoidea,* Leight. Exs. 338 !

On the smooth bark of young trees; very common in moist shady woods. These varieties often run into each other, and are not at all times separable.

8. OPEGRAPHA VULGATA, (*Ach.*) Thallus effuse, thin, cartilagineo-membranaceous, smooth, grey, greyish-white, or olive, occasionally becoming somewhat pulverulent. Apothecia black, more or less polished, sessile, scattered, very variable in size, roundish, oblong, or linear-elongated, simple or slightly divided, straight, curved or flexuose; disc narrow, rimæform, equal in width throughout, or nearly so; margin thick, rounded and inflexed; asci usually very numerous, clavate, 8 spored; spores fusiform, 6 locular, hyaline; ·005 to ·006 in. long, by ·00075 in. broad.

Lichen vulgatus, Ach. Prod. 21.—*Opegrapha vulgata,* Ach. Syn. 73. —Sm. E. Bot. 1811.—Hook. Brit. Fl. 2. 145.—Leight. Graph. 22. pl. 5. fig. 13, Exs. 194 !—*O. atra,* var. *vulgata,* Schær. Enum. 154, L. H. 516 !

b. STENOCARPA, (*Ach.*) Thallus yellowish-brown, or greyish-white. Apothecia densly crowded, very variable in size, narrow, oblong, or linear and very much elongated, curved and flexuose, forming a sort of black netlike work over the thallus.

Opegrapha stenocarpa, α. Ach. L. Univ. 275.—*O. atra,* var. *stenocarpa,* Fries. L. Ref. 367.—Schær. Enum. 153. L. H. 93 !—*O. vulgata,* β. *stenocarpa,* Leight. Graph. 24.

On the trunks of various trees in shady woods; common. This species may be always known from all the states of *atra*, by its fusiform spores. Its spermogones are generally present. They are visible to the eye, minute, punctiform, or subverrucæform, immersed or semi-immersed, dark-brown or black, isolated, scattered, intermixed with the apothecia. The spermatia are abundant, cylindrico-arcuate or sub-acicular, ·00275 to ·003 in. long. by ·00016 in. broad.

β. DUBIA, (*Leight.*) Thallus effuse, very thin, membranaceous, greyish-white. Apothecia black, slightly polished, prominent, sessile, scattered, short, oblong or linear-oblong, obtuse at the extremities, simple, straight, or curved and undulated; disc narrow, canaliculate, equal; margin elevated, rounded and inflexed; spores fusiform, straight or curved. 6-8 locular, subhyaline or hyaline; otherwise as in *vulgata*.

Opegrapha dubia, Leight, Exs. 312!

On the trunks of old oaks, usually in the clefts and hollows of the bark. Near Shrewsbury! Shropshire, *Rev. W. A. Leighton.* Near Ayton! Cleveland. This form resembles states of *O. varia*. especially *pulicaris* and *rimalis*, in its external appearance, but differs from them in the form of its asci and spores. From the ordinary state of *O. vulgata*, it appears to me to differ very slightly either externally or internally.

γ. SIDERELLA, (*Ach.*) Thallus effuse, thin, membranaceous, greyish-white, or pale brown and somewhat greasy looking. Apothecia black, prominent, more or less numerous, often crowded, confluent and sub-stellate, variously elongated, linear, the extremities obtuse, or slightly acuminated, usually simple, straight, curved, or flexuose; disc narrow, equal; margin somewhat elevated, rounded and incurved; spores as in *vulgata*.

Lichen siderellus, Ach. Prod. 24.—*Opegrapha siderella*, Ach. Meth. 25.—*O. herpetica*, var. *siderella*, Schær. Enum. 155, L. H. 96 in pt.—*O. vulgata*, var. *siderella*, Nyl. Enum. Gen. 131, L. P. 78!

On the trunks of trees in shady woods; probably common. Near Easby! Cleveland. The spermogones are usually very abundant. They are quite visible to the naked eye, punctiform or subverrucæform, more or less prominent, black, solitary, scattered over the whole surface of the thallus. The spermatia are very numerous, issuing in a dense cloud, short, subcylindrical, very slightly curved, ·00125 in. long, by 00016 in. broad. This description has been drawn up from specimens issued by NYLANDER, and the synonyms have been copied from his works; my specimens from near Easby agree with his in every respect. The spermogones and spermatia are apparently its distinguishing features. They differ from those of *vulgata*, by the spermogones being larger in size, more abundantly produced, and more prominent, and by the spermatia being shorter and much less curved. *O. siderella*, *O. rubella*, and *O. herpetica*, have been so confused and intermixed by Lichenists, that it is an exceedingly difficult matter to know which species is intended. Both FRIES and SCHÆRER have mixed them to a great extent, and their references are not at all to be relied on.

9. OPEGRAPHA RUBELLA, (*Moug.*) Thallus effuse or subdeterminate, thin, subtartareous, contiguous, slightly rimose, smooth and even when young, subsequently somewhat leproso-pulverulent, yellowish-brown or

greasy-olive. Apothecia dull black, somewhat greasy-looking, innato-subsessile, scattered, numerous, variable in size and shape, rounded, oblong, or linear, straight, or curved and undulated, simple or rarely divided; disc narrow, rimæform, equal; margin thickish, rounded and inflexed; asci obovato-clavate, 6-8 spored; spores elongato-fusiform, or acicular, straight or slightly curved, 10 to 14 locular, pale yellow; ·009 to ·011 in. long, by ·001 in. broad. PLATE 4, *fig.* 90.

Opegrapha rubella, Moug. and Nestl. Stirpes, 648.—Nyl. Enum. Gen. 131.—*O. atra*, var. *siderella*, Fries. L. Ref. 368 in pt.—*O. herpetica*, var. *siderella*, Schær. Enum. 155, L. H. 96 in pt.—*O. siderella*, Leight. Graph. 24, pl. 6. fig. 14.—Hepp Eur. 464!—*O. rufescens*, Hook. Brit. Fl. 2. 144 in pt.

On the trunks of trees, especially ash, in shady woods; rare. On young ash trees in Hoggarts Wood! and Ingleby Park! Cleveland. This is a very distinct species, and if the size and internal organisation of its spores are attended to, it cannot be mistaken for any other British species.

β. TAXICOLA, (*Leight.*) Thallus effuse, very thin, tartareous, pulverulent, somewhat rimose, pale yellowish-grey. Apothecia dull black, prominent and sessile, scattered or crowded, oblong, linear or linear-elongated, mostly simple, straight or variously curved; disc broadly rimæform, equal in width throughout; margin rounded and inflexed, rugged; spores elongato-fusiform or acicular, 14 locular, pale yellow.

Opegrapha taxicola, Leight. Graph. 25, pl. 6. fig. 15.

"On yew. Funtington Churchyard; Hunston Churchyard; and Aldingbourne Churchyard, Sussex, *Mr. Borrer.*" Distinguished from *rubella*, by its larger and more prominent apothecia, and by its place of growth. I have not seen a specimen of this form.

10. OPEGRAPHA HERPETICA, (*Ach.*) Thallus thin, membranaceous, more or less rugged and rimose, brown or greyish-olive, often tinged with red. Apothecia minute, black, innate, at length partly emersed, round, oval, oblong, or linear-oblong, simple or divided, straight or curved and undulated; disc rimæform, variable in width according to the degree of maturity; margin rounded and inflexed; asci clavate, 6-8 spored; spores fusiform, straight or curved, quadrilocular, pale yellow or hyaline; ·0035 to ·004 in. long, by ·00075 in. broad.

Lichen herpeticus, Ach. Prod. 20.—*Opegrapha herpetica*, Leight. Graph. 19. pl. 5. fig. 12.

α. VERA, *Leight.* Thallus thin, subtartareous, smooth or slightly pulverulent, rimose, dark dusky-olive. Apothecia innate, scattered, variable in size and shape, roundish, oval, oblong or linear-oblong, simple, straight or somewhat curved; disc rimæform, narrow, equal; margin thickish, rounded and inflexed; spores as above.

Opegrapha herpetica, *α. vera*, Leight. Graph. 20.—*O. herpetica*, a. Ach. L. Univ. 248.—*O. herpetica*, var. *fuscata*, Schær. Enum. 156.—Nyl. L. P. 79!—*O. rubella*, Sm. E. Bot. 2347. (exl. syn.)—Hook. Brit. Fl. 2. 144 in pt. and *O. rufescens*, Hook. Brit. Fl. 2. 144 in pt.

β. *subocellata*, (*Ach.*) Thallus effuse, thin, subtartareous, rugose, slightly pulverulent, pale brownish olive, often tinged with red. Apothecia innate, similar in size, shape, and number, to the last, but surrounded by a whitish pulverulent spurious thallodal margin; spores as above.

Opegrapha herpetica, var. *subocellata*, Ach. Syn. 73.—Schær. Enum. 156, L. H. 281 !—Nyl. L. P. 82 !—*O. herpetica*, Fries L. Ref. 368 in pt.—*O. herpetica*, var. *subocellata*, a. and b. Leight. Graph. 21., Exs. 222 !

γ. ELEGANS. Borr. Thallus effuse, thin, subtartareous, somewhat pulverulent, pale yellowish-olive, often tinged with red. Apothecia at first innate, subsequently slightly emersed, variable in size, oblong, or linear-elongated, simple or divided, elegantly curved and undulated; disc rimæform, rather broad, unequal; margin thickish, elevated, persistent.

Opegrapha herpetica, var. *elegans*, Borr. M.S.S.—Leight. Graph. 21., Exs. 286 !

δ. RUFESCENS, (*Pers.*) Thallus effuse, thin, membranaceous, smooth, somewhat shining, dark olive, more or less tinged with red. Apothecia subinnato-sessile, scattered, very numerous, variable in size and shape, oblong or linear-elongated, simple, straight or curved and undulated; disc rimæform or subcanaliculate, unequal in width; margin thickish, rounded and inflexed.

Opegrapha rufescens, Pers. in pt.—Hook. Brit. Fl. 2. 144 in pt.—*O. rubella*, α. Ach. L. Univ. 249 in pt.—*O. atra*, var. *siderella*, Fries L. Ref. 368 in pt.—*O. herpetica*, var. *rubella*, Schær. Enum. 155, L. H. 95 ! in pt.—Leight. Graph. 22., Exs. 221 !

ε. RUBIDA, (*Chev.*) Thallus as in the last. Apothecia subinnate, congregated together into substellated groups; spores as above.

Opegrapha rubida, Cheval. Hist. Graphid. 80. (fide Leighton)—*O. herpetica*, var. *rubella*, subvar. *divisa*, Leight. Graph. 22.

On the trunks of trees, especially those of young ash, in damp shady woods; all more or less common. The spermogones are of frequent occurrence. They are minute, punctiform, semi-immersed, isolated, black, scattered indiscriminately over the whole face of the thallus. The spermatia are large in proportion to the size of the spermogones, cylindrical, gibbous, the extremeties rounded and somewhat obtuse, ·00125 in. long, by ·00025 to ·0005 in. broad.

GENUS 2. STENOGRAPHA, *Mudd.*

Apothecia erumpent, lirellæform, black; disc rimæform or canaliculate, naked or pruinose, margined by a carbonaceous proper exciple, and an accessory spurious thallodal one; thalamium arising from a pale yellowish-brown, or brownish-black simple hypothecium; asci large, oblongo-ventricose, more or less attenuated at the base, 6-8 spored; spores oblong or oval, muriform-multilocular, pale yellow. Thallus membranaceous or crustaceous, uniform.

This genus is distinguished from *Graphis*, by the large muriform-multilocular spores; from *Opegrapha*, by the annular exciple, pale hypothecium, and form of the spores; from *Aulacographa*, by the simple exciple, and form of the spores.

1. STENOGRAPHA ANGUINA, (*Mont.*) Thallus membranaceous, thin, contiguous, smooth or slightly rugulose, pale yellowish-white or cream-colour. Apothecia black, erumpent, very variable in size and form, slender, more or less elongated, simple or divided, scattered or crowded, straight, curved, or flexuose; disc naked, when dry very narrow, rimæform, when wet more expanded, unequal in width;

proper margin thin, elevated, flexuose; thallodal margin membranaceous, thin, at length evanescent; hypothecium pale yellowish-brown; asci oblongo-ventricose, more or less attenuated at the base, 6-8 spored; spores oblong, or oval, muriform-multilocular, pale yellow; ·007 to ·009 in. long, by ·003 to ·004 in. broad. PLATE 4. fig. 91.

Graphis anguina, Mont. (fide Nyl.)—*Opegrapha scripta*, Ach. in pt. —Hook. Brit. Fl. 2. 147 in pt.—*Graphis scripta*, Leight. Graph. 27. pl. 6. fig. 17.—

a. DIFFUSA, *Leight.* Apothecia irregularly scattered over the whole thallus, more or less elongated, simple or divided, variously curved and undulated, unequal in width.

Graphis scripta, α. diffusa, Leight. Graph. 27.

b. FLEXUOSA, *Leight.* Thallus subdeterminate, thinnish, smooth or verruculose, at length pulverulent, greyish-white. Apothecia much elongated, crowded, distinct and separate, or running one into the other, simple or divided, variously curved and undulated.

Graphis scripta, var. *flexuosa*, Leight. Graph. 28., Exs. 18!

c. RADIATA, *Leight.* Thallus as in the last form. Apothecia crowded, radiating from a common centre, in a somewhat dendritic manner, subdichotomously divided.

Graphis scripta, var. *radiata*, Leight. Graph. 29., Exs. 339!

d. DIVARICATA, *Leight.* Apothecia very numerous, crowded, variable in size and form, short, oblong, or linear-elongated, simple or divaricately branched, curved and undulated.

Graphis scripta, var. *divaricata*, Leight. Graph. 29., Exs. 19!

On the trunks of trees in shady woods. Gloddaeth near Conway! Caernarvonshire, *Rev. W. A. Leighton.* Harpford Wood! Devonshire, *Miss M. Atwood.* Airyholme Wood! Kildale! Ingleby Park! and Hoggarts Wood! Cleveland, Yorkshire. The above varieties are all more or less connected with intermediate states.

β. PULVERULENTA, *(Sm.)* Thallus effuse, thinnish, membranaceous or subtartareous, rugulose, dull greyish-white, or cream-colour. Apothecia erumpent, subsessile, usually crowded, very variable in size and form, oblong, or linear-elongated, simple, or branched in a divaricate or a subradiate manner, curved and undulated; disc broadly canaliculate, pruinose; proper margin slightly elevated, rounded and incurved; otherwise as in *anguina.*

Opegrapha pulverulenta, Sm. E. Bot. 1754. (excl. syn.)—*Graphis pulverulenta*, Leight. Graph, 31, pl. 6, fig. 18, Exs. 20!—*Opegrapha scripta*, Hook. Brit. Fl. 2, 147 in pt.

On the trunks of trees in shady woods. Gloddaeth near Conway! *Rev. W. A. Leighton.* Newton Wood! and Sowerdale! Cleveland, Yorkshire. This is evidently only a state of *anguina.* It is distinguished chiefly by it pruinose apothecia.

2. STENOGRAPHA ANOMALA, (*Leight.*) "Thallus thin, membranous, smooth, greyish cream-coloured, limited. Apothecia excessively prominent and sessile, large, linear-oblong, obtuse at the extremities, straight or wavy, simple, occasionally tripartite; disc rimæform, more or less expanded; margin tumid and connivent; hypothecium brownish black; paraphyses conglutinate; asci linear-oblong, 8 spored; spores large, oblong or eliptical, muriform-multilocular, pale yellow."

Opegrapha anomala, Leight. in Ann. and Mag. Nat. Hist. 2 mo. 1857, Vol. 19. pl. 8. fig. 1. 2. 3. 4. 5. 6.

" On holly, Glengariffe, Co. Kerry, Ireland. *Mr. H. Piggot.*" The internal organization of the spores shews that this plant belongs to the present genus rather than *Opegrapha*. I have not seen any specimens myself. The description has been taken from LEIGHTON's pamphlet on " *New British Lichens.*"

GENUS 3. GRAPHIS, (*Adans.*)

Apothecia lirellæform, erumpent, subsessile; margined by a carbonaceous proper exciple, and at times by an accessory spurious thallodal one; thalamium arising from a pale yellowish-brown carnose, or brownish-black carbonaceous hypothecium; asci oblongo-ventricose or clavato-ventricose, 6-8 spored; spores linear-elongated, the extremities rounded, each containing from 6 to 12 transversely oval loculi, pale yellow. Thallus membranaceous or crustaceous, uniform.

Distinguished from *Opegrapha*, and *Stenographa*, by the form of the spores; from *Aulacographa*, by the simple proper exciple, and form of the spores.

1. GRAPHIS SCRIPTA, (*L.*) Thallus effuse, thin, membranaceous or subtartareous, smooth or rugose, greyish-white or cream-colour. Apothecia black, immersed when young, subsequently more or less emersed, subsessile, scattered or crowded, variously elongated, equal in width throughout, the extremities slightly attenuated or obtuse, straight, curved, or undulated; disc canaliculate, naked or pruinose; proper margin thin, elevated, flexuose; thallodal margin tumid, eventually more or less evanescent; hypothecium thin, yellowish-brown; asci subclavate or oblongo-ventricose, 6-8 spored; spores linear-elongated, at times subclavate, the extremities rounded, slightly curved or straight, each containing 8-10 transversely oval loculi, pale yellow; ·008 to ·012 in. long, by ·00125 to ·002 in. broad. PLATE 4, *fig.* 92.

Lichen scriptus, L. and Ach. in pt.—*Lichen serpentinus*, Ach. Prod. 25.—*Graphis serpentina*, Ach. L. Unv. 269.—Leight. Graph. 32. pl. 6. fig. 19.—*Opegrapha scripta*, Ach. in pt.—Fries L. Ref. 370 in pt.—Hook. Brit. Fl. 2, 147 in pt. Schær. Enum. 150.—*Graphis scripta*, Kbr. S. L. G. 287 in pt.—Nyl. Enum. Gen. 128.

α. MINUTA, (*Leight.*) Thallus thin, membranaceous, smooth, slightly shining, pale yellow or cream-coloured, limited by a brown wavy hypothalline line. Apothecia numerous, subsessile, short, straight, simple, occasionally elongated, slightly divided and curved or undulated; disc rimæform when dry, expanded and plane when wet, naked or subpruinose; margin thick, uniform, flexuose, persistent; spores as above.

Graphis serpentina, var. *minuta*, Leight. Graph. 32.

On young oaks, ashes, and alders; frequent. This form is tolerably constant, and well characterised by its numerous, scattered, short apothecia.

β. ABIETINA, (*Schær.*) Thallus effuse, thinnish, subtartareous, even, or rugose, at length more or less pulverulent, yellowish-olive or greyish white. Apothecia subimmersed, afterwards partly emersed, slender, curved and undulated, distantly scattered, simple or slightly divided; otherwise as in the last variety.

Opegrapha scripta, var. *abietina*, Schær. Enum. 151, L. H. 90!—*Graphis serpentina*, var. *diffusa*, Leight. Graph. 33.—*G. scripta*, d. Kbr. S. L. G. 287.

On the trunks of trees, especially spruce firs, alders, and hawthorns, common in shady woods.

γ. VARIA, (*Leight.*) Thallus effuse, thin, membranaceous, smooth or minutely rugose, pale yellowish olive. Apothecia immersed, numerous, slightly crowded, lying in all directions, very variable in shape and size, either short and simple, or elongated and branched, straight, curved, or undulated; disc narrow, slightly pruinose; spores as above.

Graphis serpentina, var. *varia*, Leight. Graph. 33.

On young oaks and alders; frequent.

δ. FLEXUOSA, (*Leight.*) Thallus as in the last. Apothecia very much elongated, slender, simple or very slightly divided, flexuose; disc rimæform when dry, expanded when wet, subpruinose; margin thinnish, curved and crisped; spores as above.

Graphis serpentina, var. *flexuosa*. Leight. Graph. 34.

On the trunks of various trees; frequent.

ε. HORIZONTALIS, *Leight.* Thallus thin, membranaceous, rugose, subsequently slightly pulverulent, greyish-white. Apothecia when young immersed, when old emersed so as to be on a level with the thallus or a little above it, very numerous, crowded, disposed horizontally, much elongated, slender, simple or branched, straight or flexuose; disc very narrow, rimæform, naked or somewhat pruinose, of an equal width throughout; margin thin, elevated, flexuose, persistent; spores as above.

Graphis serpentina, var. *horizontalis*, Leight. Graph. 34, Exs. 244.

On the trunks of trees, chiefly oaks and hazels; very common. This form is pretty constant, and is tolerably well characterised by the position of its apothecia.

ζ. DIVARICATA, (*Leight.*) Thallus as in the last variety. Apothecia subsessile, short and straight, or elongated and slightly curved, simple or divaricately branched, the extremities acute; disc narrow, canaliculate, more or less pruinose; margin thickish, undulated; spores as above.

Graphis serpentina, var. *divaricata*, Leight. Graph. 35, Exs. 21!

On oak, ash, and other trees; common.

η. RADIATA, (*Leight.*) Thallus thin, subtartareous, irregularly rugose, pale yellow or cream-coloured. Apothecia immersed when young, afterwards emersed so as to be a little above the level of the thallus, crowded, arranged in a radiate manner from a common centre, the radiations simple or branched; disc rather broad, canaliculate, unequal in width, nearly naked, or pruinose; margin thick, elevated, flexuose; spores as above.

Graphis serpentina, var. *radiata*, Leight. Graph. 35, Exs. 340.—*Opegragha scripta*, var. *serpentina*, Schær. Enum. 151, L. H. 91! in pt.

On the trunks of young oaks; very common in shady woods. Easily known by the radiated position of its apothecia.

θ. STELLATA, (*Leight.*) Thallus thin, membranaceous, nearly smooth, pale olive. Apothecia slightly raised above the level of the thallus, distantly scattered, arranged in small irregular stellate groups, the extremities rather acute; disc narrow, subcanaliculate, naked or somewhat pruinose, surrounded by a thickish margin; spores as above.

Graphis serpentina, var. *stellata*, Leight. Graph. 36.

On young ash and oak. Airyholme wood! Hoggarts wood! and Ingleby Park! Cleveland. This form is apparently constant. It may be known at sight, by the manner in which its apothecia are arranged.

ι. SPATHEA, (*Ach.*) Thallus thin, subtartareous, rugulose, pale yellow or greyish-white. Apothecia immersed when young, subsequently emersed so as to be above the level of the thallus, numerous, scattered in all directions, variable in size, short and elongated, simple, curved and undulated, the extremities obtuse; disc rimæform when dry, more or less expanded when wet; margin thick, rounded and incurved; spores as above.

Graphis serpentina, var. *spathea*, Ach. L. Univ. 270.—Leight. Graph. 36.—*Opegrapha scripta*, *α. limitata* b. *flexuosa*, Schær. Enum. 151, L. H 88!

On the trunks of trees in shady woods; not very common.

κ. TREMULANS, (*Leight.*) Thallus thin, subtartareous, rimose, rugulose, greyish-white. Apothecia more or less raised above the level of the thallus, numerous, scattered or crowded, elongated, simple or occasionally divided, the extremities generally obtuse, curved and undulated; disc canaliculate when dry, more expanded when wet, subpruinose, unequal in width; margin thin, undulated and crisped; spores as above.

Graphis serpentina, var. *tremulans*, Leight. Graph. 37, Exs. 22!—*Opegrapha scripta*, var. *pulverulenta*, Schær. Enum. 151, L. H. 89!—*G. scripta*, var. *fraxinea*. Nyl. L. P. 70!

On the trunks of trees, especially ash, very common in moist shady woods.

λ EUTYPA, (*Ach.*) Thallus thinnish, subtartareous, smooth or subpulverulent, often raised in irregular rugosities about the apothecia, greyish-white. Apothecia raised above the level of the thallus, very numerous, crowded, of a medium length, others more elongated, the extremities either obtuse or acute, simple or branched, flexuose and curved, lying in all directions; disc broad, canaliculate, pruinose; margin prominent, thickish, curved and undulated; spores as above.

Graphis serpentina, var. *eutypa*, Ach. L. Univ. 270.—Leight. Graph. 37.—*O. serpentina*, Sm. E. Bot. 1755.

On the trunks of various trees, but most frequently on those of ash and beech; frequent. This form may be distinguished from all the preceding, by its broad, flattened, pruinose apothecia.

μ. RECTA, (*Humb.*) Thallus thin, membranaceous, somewhat shining, pale yellowish-white, forming elongato-oblong horizontal patches. Apothecia erumpent, at length raised considerably above the level of the thallus, disposed in a horizontal direction parallel to each other, either very much elongated, simple and nearly straight, or of a medium length, simple or somewhat branched by confluence, and undulated, the extremities obtuse or acute; disc narrow, rimæform, or canaliculate, naked or subpruinose; margin elevated, thick, rounded; spores as above.

Opegrapha recta, Humb.—*O. Cerasi*, Ach. Meth. 27.—Sm. E. Bot. 2301.—*O. scripta*, var. *recta*, Fries L. Ref. 371.—Hook. Brit. Fl. 2. 147 in pt.—Schær. Enum. 151.—*Graphis serpentina*, var. *recta*, Leight. Graph. 38.—*G. scripta*, var. *recta*, Hepp Eur. 46!

On birch, cherry, and plum trees; not very common. Easby Wood! and Baysdale! Cleveland. This is a constant and well marked variety. It may be known by its habit, form of its thallus, and long narrow nearly straight apothecia.

ν. DIFFRACTA, (*Turn.*) Thallus effuse or subdeterminate, thickish, tartareous, pulverulent, rimose, rugulose, pale olive or greyish-white. Apothecia immersed, more or less elongated, equal in width throughout, the extremities obtuse, simple or branched, straight, curved or flexuose; disc canaliculate, naked or pruinose; margin elevated, thin, undulated, spores as above.

Graphis diffracta, Turn. M. S.—Leight. Graph. 39. pl. 6, fig. 21.

a. MINOR, (*Leight.*) Apothecia slightly elevated above the level of the thallus, very numerous, crowded, short, broad and simple; disc canaliculate, wide, open and concave when dry, expanded and plane when wet, naked; margin thin, elevated.

Graphis diffracta, var. *minor*, Leight. Graph. 40.

b. MAJOR. (*Leight.*) Apothecia more or less elongated, linear, slender, somewhat curved and undulated, scattered over the whole thallus.

Graphis diffracta, var. *major*, Leight. Graph. 40.

c. RADIATA, (*Leight.*) Apothecia numerous, crowded, linear-elongated, simple or repeatedly branched, arranged more or less in a somewhat radiate manner; disc subpruinose.

Graphis diffracta, var. *radiata*, Leight. Graph. 40.

d. FLEXUOSA, (*Leight.*) Apothecia crowded, more or less elongated, simple or branched, variously flexuose; disc rimæform or canaliculate, naked, margin thick, rounded and incurved, undulated.

Graphis diffracta, var. *flexuosa*, Leight. Graph. 41.

On beech and ash trees. Near Thirsk! J. G. Baker, Esq. Harpford Wood! Devonshire, *Miss M. Atwood*. Airyholme! Cleveland. These subvarieties often pass from one to another, and are not at all times distinguishable; *diffracta*, appears to me, only to differ from the varieties *eutypa* and *spathea*, by its thicker and more tartareous thallus.

2. GRAPHIS INUSTA, *Ach.* Thallus thin, membranaceous, smooth and even or rugose, pale yellowish-white. Apothecia immersed, broad, variable in length, simple or branched in a subradiate manner, more or less parallel; disc plane, naked or pruinose; margin very thin, often scarcely discernible; hypothecium thin, pale yellowish-brown; asci subclavate, 6 or 8 spored; spores linear-elongated, the extremities rounded, straight or slightly curved, each containing 6-8 transversely oval loculi, pale yellow or subhyaline; ·008 to ·011 in. long, by ·0015 to ·00175 in. broad.

Graphis inusta, Ach.—Nyl. Enum. Gen. 129.—G. *Smithii*, Leight. Graph. 41. pl. 6. fig. 22.—*Opegrapha scripta*, Sm. E. Bot. 1813.—*O. Lyellii*, Hook. Brit. Fl. 2, 147 in pt.

a. VERA, (*Leight.*) Apothecia very black, immersed, level with the face of the thallus, scattered, variously branched in a subradiate manner, the branches parallel; disc plane, naked or pruinose.

Graphis Smithii, var. *vera*, Leight. Graph. 42.

b. ELONGATA, (*Leight.*) Apothecia simple or slightly branched, linear-oblong or lanceolate, the extremities acute.

Graphis Smithii, var. *elongata*, Leight. Graph. 42.

c. DIVARICATA, (*Leight.*) Apothecia with a single branch at right angles.

Graphis Smithii, var. *divaricata*, Leight. Graph. 42.

d. SIMPLIUSCULA, (*Leight.*) Apothecia smaller, simple, scattered.

Graphis Smithii, var. *simpliuscula*, Leight. Graph. 42.

e. MACULARIS, (*Leight.*) Apothecia small, numerous, crowded, rounded or oblong.

Graphis Smithii, var. *macularis*, Leight. Graph. 42., Exs. 285 !

On the trunks of various trees. On hazel, Harpford Wood ! Devonshire, *Miss M. Atwood.* Ynys-faig ! near Barmouth, North Wales, *Rev. W. A. Leighton.* The present species resembles *G. dendritica*, in its external appearance, but is distinguished from it by its pale hypothecium, and annular exciple. It may be known from all the states of *scripta*, by its broad flat apothecia, and very thin proper margin.

3. GRAPHIS DENDRITICA, (*Ach.*) Thallus determinate, thin, tartareous, pulverulent, cream-colour, or yellowish-white; hypothallus brown, presented as a narrow watery line at the circumference of the thallus. Apothecia brownish-black, immersed, more or less crowded in the centre, either branched in a pedato-radiate manner, straight or undulated, the extremities acute, or only slightly branched, lanceolate, acute at both extremities; disc broad, plane, pruinose; proper margin very thin; thallodal margin prominent, rugose; hypothecium incorporated with the exciple, thin, dark-brown, subcarbonaceous; asci clavato-ventricose, 8 spored; spores linear-elongated, the extremities rounded, each containing 6-8 transversely oval loculi, subhyaline or pale yellow; ·008 to ·011 in. long, by ·0015 to ·002 in. broad.

Opegrapha dendritica, Ach. Meth. 31.—Sm. E. Bot. 1756.—Fries L. Ref. 372.—Hook. Brit. Fl. 2. 147.—Schær. Enum. 152, L. H. 585 in pt.—*Hymenodecton dendriticum*, α. and β. Leight. Graph. 43. pl. 7. fig. 23.—*Graphis scripta*, var. *dendritica*, Kbr. S. L. G. 287.—*G. dendritica*, Nyl. Enum. Gen. 129.

β. OBTUSA, (*Leight.*) Apothecia ramifying at an obtuse angle in a furcate manner, the extremities very obtuse, frequently furcate; thallodal margin nearly obliterated.

Hymenodecton dendriticum, var. *obtusa*, Leight. Graph. 44.—*O. dendritica*, Schær. Enum. 152, L. H. 585 in pt.

On the smooth bark of trees; rare. Harpford Wood ! Devonshire, *Miss M. Atwood.* The variety *obtusa*, is a well marked form, and apparently constant.

4. GRAPHIS LYELLII, (*Sm.*) Thallus determinate, thin ceraceo-membranaceous, smooth, pale olive, limited by a dark-brown hypothal-

line line. Apothecia brownish-black, subsessile, scattered, or crowded, oblong or linear-oblong, the extremities rounded, simple or slightly divided, straight, curved, or undulated; disc broad, plane, more or less pruinose; proper margin thin, somewhat elevated; thallodal margin white, pulverulent; hypothecium incorporated with the exciple, thinnish, brownish-black, carbonaceous; asci clavato-ventricose, 8 spored; spores linear-elongated or oblong, rounded at the extremities, each containing 6-8 transversely oval loculi, pale yellow or subhyaline; ·005 to ·007 in. long, by ·00125 to ·00175 in. broad.

Opegrapha Lyellii, Sm. E. Bot. 1876.—Fries. L. Ref. 373.—Hook. Brit. Fl. 2. 147.—Schær. Enum. 152.—*Graphis Lyellii*, Ach. Syn. 85. —Nyl. Enum. Gen. 129.—*Chiographa Lyellii*, Leight. Graph. 44. pl. 7. fig. 24.

On the trunks of trees; rare. Near Cork! Ireland, *I. Carroll, Esq.* Harpford Wood! Devonshire, *Miss M. Atwood.* This species is well characterised and in little danger of being confounded with any of the forms of *scripta, or inusta.* Its waxy looking thallus, short and broad apothecia, and the accessory white pulverulent thallodal margin, are its most prominent distinctive features.

GENUS 4. AULACOGRAPHA, (*Leight.*)

Apothecia erumpent, lirellæform, prominent, black; disc rimæform, margined by a palmatifid carbonaceous proper exciple, and by a thin accessory simple thallodal one; thalamium arising from a pale yellowish simple hypothecium; asci oblongo-ventricose, 6-8 spored; spores linear-elongated, the extremities rounded, each enveloped in an hyaline membrane, containing 11 to 13 transversely oval loculi, subhyaline or pale yellow. Thallus crustaceous or membranaceous, uniform.

This genus is distinguished from *Graphis*, by the palmatifid or longitudinally furrowed exciple, and from *Stenographa* and *Opegrapha*, by the exciple, and the internal organization of the spores.

1. AULACOGRAPHA ELEGANS, (*Sm.*) Thallus suborbicular, thinnish, membranaceous, subtartareous, rugose, pale cream-colour or greyish-white, often somewhat limited by a thin brown hypothalline line. Apothecia very numerous, frequently densely crowded, at times congregated together into subradiated groups, erumpent, prominent, sessile, oblong or linear-elongated, the extremities obtuse, simple, straight, curved or flexuose; disc very narrow, rimæform; proper margin thick, tumid, longitudinally furrowed; thallodal margin thin, membranaceous, evanescent; asci oblongo-ventricose, attenuated at the base, 6-8 spored; spores linear-elongated, enveloped in a hyaline membrane, each containing 11-13 transversely oval nuclei, subhyaline or pale yellow; ·009 to ·012 in. long, by ·002 to ·00225 in. broad. PLATE 4. *fig.* 93.

Opegrapha elegans, Smith E. Bot. 1812.—Fries L. Ref. 370.—Hook. Brit. Fl. 2. 146.—Schær. Enum. 152, L. H. 515!—*Graphis elegans*, Ach. Syn. 85.—Nyl. Enum. Gen. 129, L. P. 69!—*Opegrapha sulcata*, Tayl. Fl. Hib. pt. 2. 107—*Aulacographa elegans*, Leight. Graph. 45. pl. 7. fig. 26., Exs. 68!

On the trunks and branches of various trees, but generally the best developed on holly; common in mountainous districts. Easily recognized by the furrowed excipulary proper margins of the apothecia.

SUBTRIBE 2. ARTHONIEÆ.

Apothecia immarginate, pseudo-lirellæform, maculæform, or punctiform.

GENUS 5. STIGMATIDIUM, (*Mey.*)

Apothecia punctiform or pseudolirellæform, simple, subsimple, or radiate; disc open, plane, naked, immarginate; thalamium pale yellow, arising from a thin pale simple hypothecium; asci clavate, 8 spored; spores fusiform or acicular, 6-14 locular, pale yellow or hyaline. Thallus crustaceous, uniform.

1. STIGMATIDIUM CRASSUM, (*Dub.*) Thallus subdeterminate or determinate, thickish, turgid and undulated, cortical stratum cartilaginous, contiguous, smooth, more or less polished and shining, subsequently rimulose, greyish-white, olive, or brownish-olive, limited and intersected, through confluence, by narrow black undulated hypothalline lines. Apothecia deeply immersed in the thallus, very minute, numerous, punctiform, isolated, or densely crowded and congregated together into very minute groups or maculæ, which eventually assume, to a greater or less extent through confluence, a subradiate figure; disc at first pale watery brown, afterwards brownish-black, slightly convex, immarginate; thalamium pale, subgelatinous, rather lax; asci clavate, 8 spored; spores fusiform, 6-8 locular, subhyaline or hyaline; ·006 to ·008 in. long, by ·001 in. broad.

Stigmatidium crassum, Dub. Bot. Gall. 643.—Nyl. Enum. Gen. 132. —*Lichen obscurus*, Sm. E. Bot. 1752.—*Sagedia aggregata*, Fries L. Ref. 416.—Leight. Brit. Angi. Lich. 24. pl. 8. fig. 1., Exs. 69! and 96! —*Pertusaria crassa*, Hook. Brit. Fl. 2. 160.—*Verrucaria obscura*, Tayl. Fl. Hib. pt. 2. 96.—*Opegrapha crassa*, Schær. Enum. 159 in pt., L. H. 587!—*Sagedia crassa*, Massal. Ric. 159. fig. 308.

On the trunks of trees. Near Ryde! Isle of Wight; and Gloddaeth! near Conway, Caernarvonshire, *Rev. W. A. Leighton*. Near Thirsk! Yorkshire, *I. G. Baker, Esq.* Near Exeter! Devonshire, *Mr. E. Parfitt*. Westerdale! Cleveland. Great diversity of opinion has been entertained, and expressed by Lichenists respecting the division or genus in which this plant ought to be placed. The majority of writers have usually arranged it amongst the angiocarpous species, but at the same time been much divided as to the genus in which it ought to be placed. A few have regarded it as a gymnocarpous species and assigned to it a place among the Graphideæ: with this last view I entirely concur, as dissection clearly shows that it is much more closely allied to the two following species than to any in the angiocarpous division. The structure of the apothecia is also that of a gymnocarpous species.

2. STIGMATIDIUM HUTCHINSIÆ, (*Leight.*) Thallus at first subdeterminate, afterwards effuse, thin, crustaceous, smooth, or minutely verruculose, grey, greyish-brown, or yellowish-olive, generally surrounded by a narrow brownish-black hypothalline line when young or in detached patches. Apothecia dark-brown, or nearly black, minute, very numerous, irregularly scattered over the whole face of the thallus, immersed in slightly elevated thallodal verrucæ, the smooth sides of

which form a narrow spurious margin of a paler colour than the thallus, very variable in size and shape, round, oblong, or elongated, simple or divided, straight, curved, or flexuose; disc somewhat emersed, level with the margins of the thallodal verrucæ, plane, dilated, naked, immarginate; hypothecium thin, yellowish-brown; asci narrow clavate, 8 spored; spores fusiform, straight or slightly curved, 6-8-10 locular, subhyaline or hyaline; ·006 to ·007 in. long, by ·001 in. broad. PLATE 4. *fig.* 94.

Platygramma Hutchinsiæ, Leight. Graph. 49. pl. 7. fig. 28., Exs. 130!—*Opegrapha Hutchinsiæ*, Kbr. S. L. G. 282.—*Stigmatidium Hutchinsiæ*, Nyl. Enum. Gen. 132.

On rocks in shady situations. Ireland! *I. Carroll, Esq.* Newton Wood! Airyholme Wood! and Beech Bank! Kildale, Cleveland, Yorkshire. To the unassisted eye this species looks like a saxicole state of *Opegrapha herpetica.* It may be known by its immersed and immarginate apothecia, very thin pale hypothecium, and by the internal organization of its spores.

3. STIGMATIDIUM VENOSUM, (*Sm.*) Thallus determinate, thickish, tartareous, uneven, smooth, cream-colour, limited by a narrow black undulated hypothalline line, (and also by *Stigmatidium crassum*). Apothecia dark brownish-black, numerous, immersed, slender, variously elongated, branched, elegantly curved or undulated, the extremities obtuse; disc rounded, prominent, immarginate; hypothecium very thin, pale, subgrumous; asci subcylindrico-clavate, 6-8 spored; spores fusiform or acicular, straight or slightly curved, 12-14 locular, pale yellow, or hyaline; ·007 to ·009 in. long, by ·00075 in. broad.

Opegrapha venosa, Sm. E. Bot. 2454.—Hook. Brit. Fl. 2. 148.—*Platygramma elaborata*, Leight. Graph. 50. pl. 7. fig. 27.—*Stigmatidium venosum*, Nyl. Enum. Gen. 132.

On the trunks of trees; very rare. New Forest! ex herb. *I. Carroll, Esq.* The elongated curved and flexuose apothecia, and acicular 12 to 14 locular spores will always prevent the confusion of this species with *S. crassum*, with which it is often surrounded.

GENUS 6. PLATYGRAPHA, (*Nyl.*)

Apothecia immersed in thallodal verrucæ, pseudo-lirellæform, simple or divided, open, blackish-brown, naked, immarginate; thalamium pale, arising from a dark-brown simple hypothecium; asci obovato-clavate, 8 spored; spores fusiform or acicular, more or less curved, quadrilocular, uncoloured. Thallus crustaceous, uniform.

1. PLATYGRAPHA RIMATA, (*Fw.*) Thallus thin, tartareous, white, evanescent; thallodal verrucæ large, prominent, congregated together into groups, round, thick and tartareous, of a dirty white or cream-colour, smooth, subpulverulent, marked with irregular rugosities. Apothecia immersed, usually one in each verruca, very variable in size and shape, lirellæform, simple or divided, straight or undulated, the extremities either acute or obtuse and rounded; disc broad and expanded, blackish-brown, somewhat convex, prominent on the upper surface, slightly shining, naked and immarginate; hypothecium thickish, dark-brown; asci 8 spored; spores fusiform or acicular, more or less

curved, quadrilocular, hyaline; ·007 in. long, by ·0005 to ·00075 in. broad. PLATE 4, *fig.* 95.

Platygrapha rimata, Fw.—Nyl. Enum. Gen. 131.—*Chiodecton graphidioides,* Leight. Graph. 51. pl. 7. fig. 29.

On young ash trees. Near the Sharpstones Hill! Shropshire, *Rev. W. A. Leighton.*

GENUS 7. CHIODECTON, (*Fee.*)

Apothecia immersed in elevated subrotund thallodal verrucæ, formed of the erumpent medullary stratum, each verruca containing many anastomosing or confluent apothecia, which are at first covered by the thallus, subsequently erumpent, substellato-radiate or gyrose, pale brown, immarginate; thalamium ceraceo-gelatinous, pale, supported on the vertical divisions of a brownish-black hypothecium; paraphyses distinct, very slender, filiform; asci clavate, 8 spored; spores elongato-fusiform, often slightly curved, quadrilocular, uncoloured. Thallus crustaceous, uniform.

The removal of this genus from the angiocarpous division to the present tribe is, I think, clearly warranted, by the presence of a brownish-black distinct hypothecium, ceraceo-gelatinous thalamium, and by the absence of a perithecium or excipulary margin.

1. CHIODECTON MYRTICOLA, (*Fee.*) Thallus effuse, thin, tartareous, uneven, granuloso-pulverulent, white or cream-colour. Apothecia immersed in elevated subrotund thallodal verrucæ, irregularly scattered over the face of the thallus, at first closed, subsequently erumpent, confluent, substellato-radiate or gyrose; disc pale brown or dark-brown, pruinose, slightly depressed, immarginate; asci subpedicellato-clavate, 8 spored; spores elongato-fusiform, at times slightly curved, quadrilocular, subhyaline or hyaline; ·007 to ·008 in. long, by ·00075 to ·001 in. broad. PLATE 4. *fig.* 96.

α. ALBIDUM, (*Tayl.*) Thallus and apothecia as above.

Syncesia albida, Tayl. Fl. Hib. pt. 2. 103.—*Chiodecton albidum,* Leight. Brit. Angi. Lich. 25. pl. 8. fig. 4; and pl. 9. fig. 1.—Nyl. Enum. Gen. 135.

β. SARNIENSIS, (*Salw.*) Thallus from $\frac{1}{4}$ of an inch to $\frac{1}{2}$ a one in thickness, tartareous, colliculoso-verrucose, uneven, smooth, cream-coloured. Apothecia immersed in thallodal verrucæ, arising out of the interstices of the collicules, at first flat and somewhat depressed, afterwards emersed, covered with a thin white thallodal pruinose veil formed from the medullary stratum, each verruca containing many anastomosing apothecia; otherwise as above.

Chiodecton Sarniensis, Salwey in Litt. 1859.

On dry rocks in shady situations, in mountainous districts. α—Co. Antrim! Ireland, *D. Moore Esq.* β—On rocks, Jerbourgh! Guernsey, *Rev. T. Salwey.* This variety differs from the usual state of *albidum,* by its thallus being very much thicker and more uneven, and by the fertile verrucæ being larger, more confluent, and less prominent.

GENUS 8. ARTHONIA, (*Ach.*)

Apothecia open, pseudolirellæform, rotundato-difformed, or maculæform, innato-sessile, covered with a smooth or rugulose subgelatinous membrane, naked or pruinose, plane or tumid, immarginate; thalamium yellowish, more or less tinged with red, subgelatinous; hypothecium indistinct, or wanting; paraphyses none; asci clavate, obovate, or subpyriform, each containing 4 or 8 spores; spores oblong, ovate, or linear-clavate, 2-4-6-8 locular, hyaline or pale yellow. Thallus cartilagineo-membranaceous, uniform; at times athalline, parasitic on the thallus or apothecia of other crustaceous species.

Sect. A.—*Corticolæ.*

1. Arthonia astroidea, (*Ach.*) Thallus thin, forming small irregular transversely elongated patches, membranaceous, smooth, somewhat shining, contiguous, at length rimulose, varying in colour from white to olive, more or less limited or surrounded by a watery dark-brown hypothalline line. Apothecia innate, at first covered by the thin cortical stratum of the thallus, at length emersed, naked, numerous, somewhat crowded, distinct, rounded or linear-oblong, subsequently grouped and confluent, forming minute pedato-stellate or radiate masses; disc dark-brown or nearly black, rugulose, plane and expanded when dry, tumid and slightly convex when wet, immarginate; asci clavato-pyriform, 8 spored; spores linear-clavate, the extremities rounded, quadrilocular, pale yellow or hyaline; ·003 to ·004 in. long, by ·001 to ·0015 in. broad.

Opegrapha astroidea, Ach. Meth. 25.—Sm. E. Bot. 1847.—*O. atra*, var. *macularis*, Fries L. Ref. 367 in pt.—Hook. Brit. Fl. 2. 145 in pt.—*O. atra*, varr. *radiata*, and *astroidea*, Schær. Enum 154. 155., L. H. 16! 634!—*Coniocarpon radiatum*, Massal. Ric. 47. fig. 84; and *Arthonia vulgaris*, var. *astroites*, Massal. Ric. 48.—*Arthonia astroidea*, Leight. Graph. 53. pl. 8. fig. 32., Exs. 289!—Hepp Eur. 351! Nyl. Enum. Gen., 133.—*A. vulgaris*, var. *astroidea*, Kbr. S. L. G. 290.

On the smooth bark of trees, frequent in shady woods. Distinguished from *Swartziana*, by its stellate or radiate apothecia.

β. Swartziana, (*Ach.*) Thallus thin, cartilagineo-membranaceous, greyish-white or cream-colour, forming small rounded or oblong subdeterminate patches. Apothecia emersed so as to be a little above the level of the thallus, numerous, crowded, very irregular in shape, rounded, angular, or subradiate, isolated or confluent; disc black, plane or tumid, rugulose, immarginate; spores obovate or linear-clavate; otherwise as above.

Arthonia Swartziana, Ach. L. Univ. 42.—Sm. E. Bot. 2079.—Hook. Brit. Fl. 2. 143.—Leight. Graph. 54. pl. 8. fig. 33., Exs. 70!—*Opegrapha atra*, var. *Swartziana*, Schær. 155, L. H. 462!—*A. vulgaris*, var. *Swartziana*, Massal. Ric. 48.—Kbr. S. L. G. 291.—*A. astroidea*, var. *Swartziana*, Hepp Eur. 352!—Nyl. Enum. Gen. 133.

On the smooth bark of young trees in exposed situations; common.

γ. anastomosans, (*Ach.*) Thallus at first subdeterminate, afterwards effuse or confluent, very thin, membranaceous, smooth, greyish-white or olive. Apothecia more or less scattered, maculæform, suborbicular, distinct or confluent and somewhat radiate or angular; disc plane or tumid, naked, immarginate; spores as above.

Arthonia radiata, var. *anastomosans*, Ach. L. Univ. 146. and *A.*

Swartziana, var. *cinerascens,* Ach. in Schrad. Jour. 3. p. 13.—*Opegrapha,* varr. *cinerascens,* and *anastomosans,* Schær. Enum. 155.—*A. astroidea,* var. *anastomosans,* Hepp Eur. 353 !

On the smooth bark of young ash trees, in damp shady woods; frequent. This form is distinguished from both the preceding, by its spreading habit, and by its irregular, scattered apothecia. Their spermogones are occasionally met with. They are very minute, punctiform, immersed, brownish-black, intermixed with the apothecia, or scattered towards the circumference of the thallus. The spermatia are tolerably numerous, subcylindrical, slightly curved or gibbous, ·001 to ·00125 in. long, by ·0002 in. broad.

2. ARTHONIA EPIPASTA, (*Ach.*) Thallus very thin, forming irregular transversely oblong or elongated patches, membranaceous, smooth, shining, greyish-olive or copper-colour. Apothecia minute, innate, at length slightly emersed, scattered over the thallus in a parallel transverse direction, very variable in shape, rounded or oblongo-elongated, straight or somewhat undulated, simple or rarely divided; disc at first covered by the thin membranaceous thallus, at length open, naked, dark brownish-black, plane or tumid, immarginate; asci short, pyriform, 8 spored; spores linear-clavate or obovate, bilocular or quadrilocular, subhyaline or hyaline; ·003 in. long, by ·001 in. broad.

Opegrapha epipasta, and *β. microscopica,* Ach. Syn. 74. 75.—Sm. E. Bot. 1828 and 1911.—Hook. Brit. Fl. 2. 144.—*Arthonia epipasta, β. microscopica,* Leight. Graph. 51. pl. 7. fig. 30.—*A. epipasta,* Kbr. S. L. G. 392.—*A. astroidea,* var, *epipasta,* Nyl. Enum, Gen. 133.

On the smooth bark of trees, especially of hazels and young oaks. On hazel, Hoggart's Wood ! and Bousdale Gill ! and on young oaks, Cliffrigg ! all in Cleveland. This species is distinguished from all the forms of *astroidea,* by its thallus being much thinner, and of a different colour, and by its apothecia being more minute, more scattered, and very rarely becoming confluent.

3. ARTHONIA PUNCTIFORMIS, *Ach.* Thallus indeterminate, very thin, membranaceous, smooth, even, somewhat shining, pale brown or copper-colour, often scarcely visible. Apothecia minute, punctiform, subinnate, irregularly scattered over the whole thallus, solitary or congregated together into minute subradiate groups; disc brownish-black, slightly convex, immarginate; asci pyriform, 6-8 spored; spores broadly clavate, normally quadrilocular, upper loculus larger than the lower ones, more or less constricted opposite the dissepiments, hyaline; ·004 to ·0045 in. long, by ·0015 in. broad.

Arthonia punctiformis, Ach. L. Univ. 141.—Leight. Graph. 53. pl. 7. fig. 31.—Kbr. S. L. G. 293.

β. OLIVACEA, *(Ach.)* Apothecia rather large, subinnate, distantly and sparingly scattered in a very irregular manner over the whole face of the thallus, maculæform, round or broadly oblong; disc brownish-black, minutely tuberculose or rugose, plane or somewhat convex, immarginate; spores linear-oblong or subclavate, quadrilocular, each loculus containing a rounded hyaline nucleus, more or less constricted in the middle or opposite the dissepiments, hyaline; ·005 in. long, by ·0015 in. broad.

Arthonia punctiformis, α. olivacea, Ach. L. Univ. 141.—Leight. Exs. 223 !

γ. GALACTINA, (*Ach.*) Thallus thin, pale yellow or cream-colour; otherwise as in *olivacea.*

Arthonia punctiformis, β. Ach. L. Univ, 141.—Leight. Graph. 53.

On the smooth bark of trees, especially of hazels; frequent in shady woods in mountainous districts. The spores of the variety *olivacea,* are very similar to those of *Arthopyrenia epidermidis,* a species of which in one or other of its forms often accompanies it, and unless the structure of their apothecia are duly observed, they are not at all times easily distinguished. The flattened and more or less rugose apothecia are the most prominent external distinguishing characters of the *Arthonia.* The figures of the *spores* in LEIGHTON'S "*Monograph of the British Graphideæ,*" pl. 7. fig. 31. b. are not strictly correct.

4. ARTHONIA ILICINA, *Tayl.* Thallus thin, membranaceous, smooth, somewhat shining, pale yellow or cream-colour, limited by an irregular undulated watery brown hypothalline line. Apothecia small, subimmersed, numerous, scattered, maculæform, irregularly rounded or oblong; disc brownish-black, slightly shining, plane, immarginate; asci ovate or broadly pyriform, 8 spored; spores obovato-clavate, often slightly curved, 7-8 locular, the upper loculus larger than the lower ones, pale yellow or hyaline; ·007 in. long, by ·002 in. broad at the apex, and by ·001 in. at the base.

Arthonia ilicina, Tayl. Fl. Hib. pt. 2. 105.—Leight. Graph. 56. pl. 8. fig. 36.

On holly. Glengariff! Ireland, *I. Carroll, Esq.* The internal organization of the spores, if regarded, will always prevent the confusion of this species with the following one, which occurs in similar localities.

5. ARTHONIA ASPERSA, *Leight.* Thallus indeterminate, thinnish, membranaceous, smooth, greyish-white or cream-colour. Apothecia subsessile, very numerous, scattered, maculæform, variable in size and outline, rounded, oblong, or angular; disc more or less raised above the level of the thallus, black, smooth, plane or slightly convex, immarginate; asci broadly obovate, 8 spored; spores obovate, quadrilocular, upper loculus much larger than the lower ones, pale yellow or hyaline; ·003 in. long, by ·001 in. broad. PLATE 4. *fig.* 97.

Arthonia aspersa, Leight. in Ann. and Mag. Nat. Hist. 10mo. 1856., New Brit. Artho. 5. pl. 11. fig. 11—15.

On the trunks of old hollies. Farndale! Yorkshire. Hobhole! and Baysdale! Cleveland. This species may be always known from *ilicina,* its nearest ally, by its more spreading habit, dull and thicker thallus, and smaller quadrilocular spores.

6. ARTHONIA IMPOLITA, (*Ehrh.*) Thallus effuse, thinnish, tartareous, uneven, rimulose, white or bluish-white. Apothecia small, innate, maculæform, rounded or irregularly oblong, solitary or confluent; disc plane or slightly convex, rugulose, pale brown or lead-colour, cæsio-pruinose, immarginate; asci subventricose, 8 spored; spores obovate or linear-clavate, the extremities obtuse, normally quadrilocular, at times 6 locular, upper loculus rather larger than the lower ones, pale yellow or hyaline; ·003 to ·00325 in. long, by ·001 in. broad.

Lichen impolitus, Ehrh. Crypt. 274.—*Arthonia impolita,* Borr. in E.

Bot. Suppl. 2692. fig. 1.—Hook. Brit. Fl. 2. 143.—Tayl. Fl. Hib. pt. 2. 104.—Schær. Enum. 242, L. H. 506!—Leight. Graph. 55. pl. 8. fig. 35., Exs. 131!—*Parmelia impolita,* b. Fries L Ref. 183.—*Arthonia pruinosa,* Massal. Ric. 51. fig. 96.—Nyl. Enum. Gen. 132., L. P. 83! —*Leprantha impolita,* Kbr. S. L. G. 295.

On the trunks of old trees in shady woods. Bishop Auckland! Durham, *Rev. J. Harriman.* Near Ripon! Yorkshire, *Mr. W. Brunton.* Ingleby Park! Hoggart's Wood! and Newton Wood! Cleveland. Easily known by its tartareous thallus, and pale brown or lead-coloured cæsio-pruinose apothecia.

7. ARTHONIA GREGARIA, (*Weig.*) Thallus subdeterminate or effuse, thin, leproso-tartareous, variable in colour, white, greyish-white, or cream-colour, more or less tinged with purple. Apothecia small, sessile, variously difformed, solitary or confluent; disc plane or slightly convex, lurid, pruinose, or covered with a bright vermilion powder, immarginate; asci obovato-clavate or pyriform, 6-8 spored; spores obovato-clavate, rounded at the extremities, quadrilocular, the upper loculus larger than the lower ones, pale yellowish-red, or hyaline; ·004 to ·0055 in. long, by ·002 in. broad at the apex, and by ·00125 in. at the base.

Sphæria gregaria, Weigel.—*Spiloma tumidulum,* Ach.—Sm. E. Bot. 2151.—*Coniocarpon cinnabarinum,* Fries L. Ref. 379.—Leight. Graph. 58. pl. 8. fig. 40.—*Spiloma gregarium,* Hook. Brit. Fl. 2. 167.—*Coniocarpon gregarium,* Schær. Enum. 242, L. H. 239!—Massal. Ric. 46. fig. 82.—*Arthonia gregaria,* Kbr. S. L. G. 291.—*A. cinnabarina,* Nyl. Enum. Gen. 132.

a. CINNABARINUM, (T. and B.) Thallus thin, subtartareous, smooth or slightly rugulose, white or cream-colour. Apothecia subsessile, rounded or oblong and difformed, solitary or confluent, covered with a bright vermilion powder.

Spiloma gregarium, var, *cinnabarinum,* Turn. and Borr,—*Coniocarpon.* Leight. Graph. 59., Exs. 249!

b. ROSACEUM, (T. and B.) Thallus rather thicker than in the preceding. Apothecia more or less grouped and confluent, pulverulent, vermilion-coloured.

S. gre. var. *rosaceum,* Turn. and Borr.—*Coniocarpon.* Leight. Graph. 59.

c. MARGINATUM, (T. and B.) Apothecia somewhat convex, livid, their margins pulverulent and vermilion-coloured.

S. gre. var. *marginatum,* Turn. and Borr.—*Coniocarpon.* Leight. Graph. 59., Exs. 250!

d. CONCOLOR, (T. and B.) Thallus thickish, subtartareous, smooth or slightly pulverulent, creamy-white. Apothecia scattered or crowded, convex, cæsio-pruinose, concolorous with the thallus.

S. gre. var. *concolor,* Turn. and Borr.—*Coniocarpon.* Leight. Graph. 60., Exs. 251!

e. DUBIUM, (T. and B.) Thallus thin, leprous, greyish-white, more or less tinged with purple. Apothecia somewhat convex, lurid, dark purplish, pruinose.

S. gre. var. *dubium,* Turn. and Borr.—*Coniocarpon.* Leight. Graph. 60.

f. DETRITUM, (T. and B.) Thallus as in the last, or nearly so. Apothecia depressed, lurid, dark purplish, nearly naked, more or less stellate.

S. gre. var. *detritum.* Turn. and Borr.—*Coniocarpon.* Leight. Graph. 60.

g. MICROSTIGMA, (T. and B.) Thallus thin, filmy, greyish-white, slightly tinged with purple. Apothecia minute, solitary, depressed, cæsio-pruinose.

S. gre. var. *microstigma,* Turn. and Borr.—*Coniocarpon,* Leight. Graph. 60.

h. ASTROIDEUM, (*Leight.*) Thallus either thin, smooth, and of a dull reddish hue, or thicker, and minutely rimulose, greyish-white or cream-colour. Apothecia subimmersed, depressed, naked, confluent in radiate or stellate groups, rarely simple, dark reddish-black.

Coniocarpon cinnabarinum, var. *astroideum,* Leight. Graph. 60.

On the bark of various trees, usually near the base of their trunks; all more or less common in moist shady woods. The varieties *a, d, e,* and *h,* are tolerably constant, the others apparently are subject to change, according to the degree of light or shade.

8. ARTHONIA VINOSA, *Leight.* Thallus effuse, widely spreading, thin, membranaceous, smooth, pale brownish-white or cream-colour, subsequently more or less leprous. Apothecia minute, sessile, very numerous, scattered and solitary, or crowded and confluent, rounded or of an irregular oblong form; disc plane or tumid, of a deep vinous red colour, which colour is also generally imparted to the thallus around the base of the apothecia; asci broadly obovate, 8 spored; spores linear-oblong or obovate, bilocular, the upper loculus rather larger than the lower one, hyaline, or filled with a grumous protoplasm; ·003 in. long, by ·001 in. broad.

Arthonia vinosa, Leight. in Ann. and Mag. Nat. Hist. 10mo. 1856., New Brit. Artho. 5. pl. 11. fig. 6—10.

On the trunks of old oaks and alders in mountainous districts. Newton Wood! Stogdale! and Oggeray Gill! Cleveland, Yorkshire. This species somewhat resembles *A. lurida* in its general aspect, but differs from it, by always occurring on the upper part of the trunks of the trees on which it germinates, by its more spreading habit, distinct pale brownish-white or cream-coloured thallus, deep vinous colour of the apothecia, which colour is also imparted to the thallus around them, and by its much larger spores. The spermogones are occasionally met with. They are excessively minute, punctiform, somewhat prominent, solitary, scattered, intermixed with the apothecia and of the same colour. The spermatia are very numerous, in comparison with the minuteness of the spermogones; they are subcylindrical or ellipsoid, straight, ·00075 to ·001 in. long, by ·0002 in. broad.

9. ARTHONIA LURIDA, *Ach.* Thallus effuse, very thin, often scarcely distinguishable, smooth, pale-olive or greyish-brown. Apothecia small, maculæform, sessile, appressed, very numerous, rounded or oblong, solitary or confluent; disc naked, plane or slightly tumid, dull red or reddish-black, immarginate; asci short, pyriform, 6-8 spored; spores oblong or obovate, bilocular, unequal, subhyaline or hyaline; ·0015 to ·00175 in. long, by ·0005 to ·00075 in. broad.

Arthonia lurida, Ach. L. Univ. 143.—Borr. in E. Bot. Suppl. 2692.

fig. 2.—Hook. Brit. Fl. 2. 143.—Schær. Enum. 242; L. H. 17!—Hepp Eur. 161!—Leight. Graph. 57, pl. 8. fig. 38.—Nyl. Enum. Gen. 132. —*Coniangium vulgare*, Fries L. Ref. 378.—*C. luridum*, Kbr. S. L. G. 298.

β. SPADICEA, (*Leight.*) Spores clavæform, quadrilocular, or each containing two, three, or four rounded nuclei, hyaline or pale yellow; ·002 in. long, by ·00075 in. broad. Otherwise as above.

Arthonia spadicea, Leight. Graph. 57. pl. 8. fig. 39., Exs. 97!—Nyl. Enum. Gen. 132.

On the smooth bark of trees, especially oaks, hazels, hawthorns, and hollies, usually close to the ground; common in shady woods. The spermogones are not unfrequently present. They are very minute, punctiform, somewhat flattened, intermixed with the apothecia and of the same colour. The spermatia are numerous, short, ellipsoid or broadly elliptical, ·0005 to ·00075 in. long, by ·0002 to ·00025 in. broad.

SECT. B.—*Saxicolæ.*

10. ARTHONIA TRACHYLIOIDES, (*Nyl.*) Thallus effuse or subdeterminate, rather thick, contiguous, smooth, subsequently leproso-pulverulent, cream-colour, more or less tinged with rose. Apothecia small, black, very numerous, sessile, rounded, solitary, rarely confluent; disc plano-convex, immarginate, black-pulverulent and rugose when old; asci short, pyriform, 6-8 spored; spores obovate or linear-clavate, the extremities rounded, quadrilocular, upper loculus rather larger than the lower ones, subhyaline or hyaline; ·003 to ·0035 in. long, by ·001 in. broad. PLATE 4. *fig.* 98.

Arthonia trachylioides, Nyl. Enum. Gen. 133.—*Trachylia Arthonioides*, Fries. L. Ref. 403.—Kbr. S. L. G. 300.—*Lecidea*. Ach. L. Univ. 178.

On rocks in subalpine or mountainous districts. Farndale! Yorkshire, Highcliff! and on the walls of Ingleby Park! Cleveland. This species bears a strong resemblance to a *Lecidea* in its external aspect, and unless due care is exercised in the dissection of its apothecia, it will not be easily identified as an *Arthonia*. The chief distinguishing characters to be observed, are its immarginate apothecia, floccoso-subgelatinous thalamium, short broadly pyriform asci, obovate quadrilocular spores, and the total absence of paraphyses. Its spermogones are of frequent occurrence. They are excessively minute, punctiform, prominent, rounded and convex, black, solitary, intermixed with the apothecia. The spermatia are numerous, short, ellipsoid, ·00075 in. long, by ·0002 in. broad.

11. ARTHONIA PARASEMOIDES, *Nyl.* Thallus none. Apothecia parasitic on the *apothecia* of *Lecanora glaucoma*, sessile, rounded, either single or two or three arising as slightly elevated black maculæ on the disc of an apothecium, eventually becoming confluent and entirely covering it, black, somewhat rugulose, more or less convex, immarginate; asci pyriform, 8 spored; spores oblong or obovate, the extremities rounded, bi-tri-quadrilocular, hyaline; ·003 in. long, by ·001 in. broad.

Arthonia parasemoides, Nyl. Syn. Artho., et Enum. Gen. 133.—*A. glaucomaria*, Leight. in Ann. and Mag. Nat. Hist. 10mo. 1856., New. Brit. Artho. 3. pl. 11, fig. 1—5., Exs. 247!

Parasitic on the apothecia of *Lecanora glaucoma,* and *Lecidea parasema.* On the apothecia of *L. glaucoma,* Long Mynd! Shropshire, *Rev. W. A. Leighton.* Cliffrigg! and on Ayton Moor! Cleveland, Yorkshire. Easily known from all the other British *Arthoniæ,* by its place of growth. *A. glaucomaria,* Nyl. I understand is not identical with our plant.

12. ARTHONIA PUNCTELLA, *Nyl.* Thallus none. Apothecia parasitic on the thallus of *Diplotomma alboatrum,* innato-subsessile, punctiform, solitary, scattered, visible to the eye as very minute black points on the alien thallus; asci short, broad, nearly round, 6-8 spored; spores obovato-clavate, bilocular, upper loculus larger than the lower one, hyaline; ·0025 in. long, by ·001 in broad.

Arthonia punctella, Nyl. *Carroll* in litt. 1860.

Parasitic on the thallus of *Diplotomma alboatrum.* Near Queenstown! Ireland, *I. Carroll Esq.* Readily known from the apothecia of the *Diplotomma,* by their diminutive size, broad and rounded asci, and obovate bilocular hyaline spores.

GENUS 9. ARTHOTHELIUM, (*Massal.*)

Apothecia minute, at first innate and covered with the thallus, subsequently erumpent, difformed, immarginate; thalamium yellowish-brown, subgelatinoso-mucilaginous; hypothecium indistinct; paraphyses none; asci broadly obovato-subpyriform, 8 spored; spores oblong or obovate, muriform-multilocular, uncoloured. Thallus crustaceous or membranaceous, uniform.

1. ARTHOTHELIUM DISPERSUM, (*Duf.*) Thallus very thin, membranaceous, smooth, contiguous, somewhat rimulose when dry, greyish-white or cream-colour, limited by a narrow undulated brownish-black hypothalline line. Apothecia very minute, erumpent, simple or minutely radiate, 4 to 6, or more, congregated together into little groups which are dispersed in an irregular manner over the face of the thallus; disc plane, slightly tumid when moist, brownish-black, immarginate; acsi rounded or broadly obovato-pyriform, 8 spored; spores oblong or obovate, muriform-multilocular, pale yellow, or hyaline; ·004 to ·005 in. long, by ·002 in. broad. PLATE 4. *fig.* 99.

Arthonia dispersa, Duf.—Nyl. Enum. Gen. 133.

On the smooth bark of trees, chiefly on that of young oaks and hazels. Ireland! *Miss Hutchins.* For an examination of this excellent species I am indebted to *I. Carroll Esq.,* who I understand was the first to recognise it as British. It differs from all the other native *Arthoniæ,* by the internal organization of its spores.

GENUS 10. STIGMATELLA, *Mudd.*

Apothecia minute, innate, punctiform, often becoming confluent and assuming a pseudo-lirellæform aspect, immarginate; thalamium gelatinous when moist, yellowish-brown; hypothecium indistinct; paraphyses none; asci linear-clavate, attenuated at their base, 6-8 spored; spores clavate, 6-locular, coloured. Thallus crustaceous, uniform.

1. Stigmatella circumscripta, (*Tayl.*) Thallus at first subdeterminate, afterwards effuse, widely spreading, thick, tartareous, rimulose, even, pruinose or subpulverulent, glaucous-white, surrounded by a narrow dark brown hypothalline line when young, subsequently evanescent. Apothecia very minute, brownish-black, punctiform, emersed so as to be on a level with the face of the thallus, densely crowded, congregated together into little patches, solitary and distinct, or confluent in minute lines; disc pruinose when young, naked when mature, plane or slightly convex, immarginate; asci linear-clavate, 6-8 spored; spores clavate, 6 locular, dark-brown; ·005 in. long, by ·0015 in. broad at the apex, and by 00075 in. at the base. Plate 4. *fig.* 100.

Verrucaria circumscripta, Tayl. Fl. Hib. pt. 2. 96.—*Sagedia circumscripta*, Leight. Brit. Angi. Lich. 24. pl. 8. fig. 2.

On rocks in shaded situations. County of Antrim! Ireland, *D. Moore, Esq.* Airyholme wood! Cleveland, Yorkshire. The structure of the apothecia of this species shews that it does not belong to the *angiocarpi;* they are entirely destitute of a proper perithecium or excipulum, hypothecium, and of paraphyses, consequently it cannot consistently be allowed to remain in that *division.* The absence of the parts just mentioned, assimilates it to *Arthonia,* and indicates the present *subtribe* as its most appropriate place in the arrangement of species.

Tribe 10. Caliciaceæ, (*Fries.*)

Thallus crustaceous, uniform, or altogether wanting. Apothecia sessile, subsessile, or stipitate, cupuliform, pyriform, turbinate, or globose; excipulary margin for the most part, attenuated into the stipe below; epithecium or disc eventually expanded, displaying the spores in a naked pulverulent mass.

The *Calicieæ* are somewhat allied to *Lecideæ,* and to *Sphærophoreæ;* the analogies being on the one hand between *Buellia* and *Acolium,* in the general external aspect, and colour of the spores, of their respective species, and on the other between *Sphærophoron, Calicium* and *Cyphelium,* in the internal structure of their apothecia, evanescent asci, and accumulations of naked spores. The tribe is nevertheless distinct and natural; but various opinions have been promulgated respecting its position in the general arrangement. Schærer constitutes *Cladoniaceæ, Sphærophoraceæ,* and the *present tribe,* into a separate group, assigning to it the name *Lichenes Capitati,* and places it between the *Graphideæ* and *Verrucarieæ.* Nylander adopts a similar though more modified arrangement; he discards the *Cladonieæ,* but retains the *Sphærophoreæ,* and places the group at the head or commencement of the *Family Lichenacea,* under the name *Epiconiodei.* Fries and Koerber retain the tribe separate, and place it after *Graphidaceæ,* or at the end of the division *Gymnocarpi.* With regard to the distinctness, and position of the tribe, I concur with these last authors, and am of opinion that its alliance to the *Sphærophoreæ,* is not so sufficiently manifest, as to warrant their annexation into one group or tribe. The habit and outward appearance of their respective species are totally different.

Genus 1. Acolium, (*Ach.*)

Apothecia innato-sessile or sessile, obconico-subpatellæform or cupuliform, margined by a thin black proper exciple; thalamium arising from a very thin hypothecium, which is usually incorporated with the excipulum beneath; asci very numerous, elongato-clavate, pedicellate, 8 spored; paraphyses filiform, emerging a little before they arrive at maturity, and when fully developed, together with the asci, disappear; spores oblongo-obtuse, bilocular, more or less constricted in the middle, coloured, generally displayed as a naked pulverulent mass on the epithecium or disc of the thalamium. Thallus crustaceous, uniform, or altogether absent.

1. Acolium tigillare, (*Ach.*) Thallus effuse, subtartareous, granulato-verrucose, at length areolate, bright greenish-yellow. Apothecia innate in the areolæ; disc plane, black, naked, rugulose; excipulary margin tumid, prominent, subsequently excluded by the accumulation of naked spores on the epithecium; asci narrow elongato-clavate, 8 spored, subsequently evanescent; spores oblongo-obtuse, more or less constricted in the middle, bilocular, green or dark olive-brown; ·003 to ·0035 in. long, by ·00175 to ·002 in. broad.

Lichen tigillaris, Ach. Prod. 67.—Sm. E. Bot. 1530.—*Calicium tigillare*, Ach. *Syn.* 55.—Fries L. Ref. 400.—Hook. Brit. Fl. 2. 139.—Schær. Enum. 165, L. H. 451!—Hepp Eur. 159!—*Acolium tigillare*, De Not. Framm. 9.—Kbr. S. L. G. 303.—*Trachylia tigillaris*, Nyl. Calic. 29.

On old posts, pales, &c., in the eastern counties of England. This is one of the most elegant species in the whole tribe. It is well characterised by its areolate bright greenish-yellow thallus and innate apothecia.

2. Acolium tympanellum, (*Ach.*) Thallus effuse, subtartareous, granulate or plicato-verrucose, grey or greyish-white. Apothecia of a medium size, elevato-sessile, numerous; disc black, plane or slightly tumid, rugulose, cinereo-pruinose or naked; excipulary margin thin, prominent, black, often white-pruinose; asci narrow elongato-clavate, 8 spored, subsequently evanescent; spores usually displayed as a pulverulent mass on the epithecia, oblongo-obtuse, more or less constricted in the middle, bilocular, green or dark olive-brown; ·003 to ·0035 in. long, by ·0015 to ·00175 in. broad. Plate 4. *fig.* 101.

Calicium tympanellum, Ach. L. Univ. 233.—Fries L. Ref. 401.—Hook. Brit. Fl. 2. 139.—*Lichen inquinans*, Sm. E. Bot. 810.—*Calicium inquinans*, Schær. Enum. 164, L. H. 438.—*Lecidea dubia*, Leight. Exs. 88!—*Acolium tympanellum*, De Not. Framm. 10.—Kbr. S. L. G. 303.—*Trachylia tympanella*, Nyl. Calic. 30.

On dead trees, posts, pales &c., in mountainous districts. Eglestone! Durham, *Rev. J. Harriman*, Farndale! and Rosedale! Yorkshire. Ingleby Park! Cleveland. Readily known by the granulato-verrucose thallus and the accumulations of naked spores on the epithecia, which cause the apothecia to have a ruguloso-pulverulent appearance.

3. Acolium stigonellum, (*Ach.*) Thallus none. Apothecia parasitic on the thallus of servdiiferous states of *Pertusariæ*, of a medium size, numerous, scattered, innato-sessile! disc black, plane or slightly tumid, naked; excipulary margin thinnish, prominent, black, occasionally pruinose; asci narrow clavate, 8 spored, evanescent; spores usually

displayed as a ruguloso-pulverulent mass on the epithecia, oblongo-obtuse, more or less constricted in the middle, bilocular, green or dark olive-brown ; ·0025 to ·003 in. long, by ·0015 in. broad.

Calicium stigonellum, Ach. L. Univ. 232, Syn. 56.—Fries L. Ref. 401.—Leight. Exs. 226;—*C. sessile*, Hook. Brit. Fl. 2. 138 in pt.—*C. inquinans*, var. *sessile*, Schær. Enum. 164.—*Acolium stigonellum*, De Not. Framm. 10.—*A. tympanellum*, var. *stigonellum*, Kbr. S. L. G. 303. —*Trachylia stigonella*, Nyl. Calic. 32, L. P. 17 !

Parasitic on the thalli of sorediiferous states of *Pertusariæ*. Teesdale ! Durham, *Rev. J. Harriman*. Easby Wood ! and near Ingleby ; Cleveland. Distinguished from the preceding, by its different habit and smaller naked apothecia ; from *Sphinctrina turbinata*, by its cupuliform apothecia, evanescent asci, and accumulations of naked spores on the epithecia.

GENUS 2. SPHINCTRINA, (*Fries.*)

Apothecia globoso-turbinate or pyriform, black, sessile or substipitate; excipulary margin polished, thickish, connivent; thalamium arising from a very thin hypothecium, which is more or less incorporated with the excipulum beneath; asci elongato-cylindrical, 8 spored, uniserial; paraphyses filiform, flaccid; spores globose, or subglobose, unilocular, coloured. Thallus crustaceous, uniform, or altogether absent.

1. SPHINCTRINA ANGLICA, *Nyl.* Thallus effuse, thin, subtartareo-granulose, rugulose, olive-green or brown. Apothecia minute, scattered, subpyriform or turbinate, sessile or attenuated at the base into a very short stipe, black, slightly polished; disc depressed; excipulary margin thick, inflexed or connivent; asci elongato-cylindrical, 8 spored; spores uniserial, globose or subellipsoid, unilocular, dark-olive; ·00125 to ·002 in. in diameter.

Sphinctrina anglica, Nyl. Syn. Lich. 143, ined.—*Lichen microcephalus*, Sm. E. Bot. 1865.—*Calicium microcephalum*, Turn. and Borr. Lich. Brit. 130.—Hook. Brit. Fl. 2. 138.

On old rails, &c. Albourne ! Sussex, *Mr. Borrer*. in herb. *Rev. W. A. Leighton*. This species is distinguished from the following one, by the presence of a distinct subtartareo-granulose thallus, smaller apothecia, and larger spores. NYLANDER describes another plant as the "*C. microcephalum*," (*tubæformis* of Massal. et Krb.) of Auct. (which appears to me to be only a variety of *turbinata*) and assigns the following as his reason for the nonadoption of the original name of "*microcephalum*" for the British species "Nomen *microcephala*, jam alii datum, non convenit, nam apothecia potius majora quam minora iis *turbinatæ*."

2. SPHINCTRINA TURBINATA, (*Pers.*) Thallus none. Apothecia parasitic on the thalli of *Pertusariæ*, minute, numerous, scattered, pyriform or globoso-turbinate, sessile or substipitate, black, polished; disc depressed, black; excipulary margin thick, inflexed; asci cylindrical, 8 spored, subsequently evanescent; spores uniserial, globose or subglobose, unilocular, greenish-olive; ·001 to ·00125 in. in diameter. PLATE 4. *fig.* 102.

Calicium turbinatum, Pers. Fung. 59.—Fries L. Ref. 402.—Schær.

Enum. 163, L. H. 6!—Leight. Exs. 132!—*C. sessile,* Sm. E. Bot. 2520. —Hook. Brit. Fl. 2. 138.—*Sphinctrina turbinata,* De Not. Fram. 16.—Kbr. S. L. G. 305.—Nyl. Calic. 6.

β. MICROCEPHALA, (*Nyl.*) Apothecia pyriform or clavato-tubæform, sessile or substipitate, very black; disc plano-urceolate, black; margin thick, inflexed; asci cylindrical, 8 spored; spores broadly elliptical or oblong, unilocular, greenish-olive; ·002 to ·0025 in. long, by ·0015 in. broad.

Sphinctrina microcephala, Nyl. Calic. 6.—*S. tubæformis,* Kbr. S. L. G. 305.

Parasitic on the thalli of *Pertusaria communis* and P. *fallax;* very common in mountainous districts. β. On the thallus of *P. melaleuca,* in herb.! *Admiral Jones.* This only differs from the ordinary state of *turbinata,* by its spores being broadly elliptical or oblong and rather larger in size. Both forms are easily known by their polished very black turbinate or pyriform apothecia, cylindrical asci, and unilocular greenish-olive spores.

GENUS 3. STENOCYBE, (*Nyl.*)

Apothecia stipitate, clavato-pyriform, truncate, brownish-black or black; excipulary margin thick, inflexed; thalamium arising from a thin simple hypothecium, which is more or less incorporated with the excipulum beneath; asci narrow, linear, subpedicellate, 8 spored; spores elliptical, bi-quadrilocular, coloured. Thallus indistinct, or absent.

1. STENOCYBE EUSPORUM, *Nyl.* Thallus indistinct, or none. Apothecia scattered, or here and there congregated into little groups, stipitate, clavato-pyriform, truncate, slightly polished, dark brownish-black or black; stipes smooth, varying from $\frac{1}{16}$ to $\frac{1}{4}$ of an inch in length; disc minute, depressed; excipulary margin thick inflexed; asci linear, 8 spored; paraphyses very long, flaccid; spores elliptical, more or less attenuated at the extremities, bi-quadrilocular, dark-brown; ·008 to ·012 in. long, by ·00325 to ·004 in. broad. PLATE 4, *fig.* 103.

Calicium eusporum, Nyl. in Zw. Exs. 71.—*Stenocybe major,* Nyl. in Bot. Notis. 1854. p. 84.—Kbr. S. L. G. 306.—*Sphinctrina septata,* Leight. in Ann. & Magaz. Nat. Hist. 1857. p. 7., New Brit. Lich. 7. pl. 8. fig. 20—25.

On the bark of old hollies, and occasionally parasitic on the thalli of *Thelotrema lepadinum,* and *Aulacographa elegans.* Brantsdale! and Farndale! Yorkshire. Bousdale Gill! Ingleby Park! and Hoggart's Wood! Cleveland. This is a very distinct species. It may be known from all the other *Caliciecæ,* by its scattered mode of growth, and large bi-quadrilocular dark-brown spores.

GENUS 4. CALICIUM, (*Pers.*)

Apothecia stipitate, turbinate or crateriform, black; excipulary margin horny, black, variously pruinose; thalamium very thin, pale, arising from an excipulary hypothecium; asci very numerous, cylindrical, 8 spored, subsequently evanescent; paraphyses floccose; spores oblong, the extremities rounded or attenuated, usually constricted in the middle, bilocular, coloured, generally displayed as a naked compact pulverulent mass on the epithecium or disc of the thalamium. Thallus crustaceous, uniform, often obliterated; hypothallus very thin, byssoid.

1. CALICIUM CURTUM, *Turn.* and *Borr.* Thallus effuse, very thin, minutely granulose, greyish-white; hypothallus subbyssoid, white. Apothecia small, very numerous; capitula turbinate, or subcylindrical, black; stipes short, thickish; disc at first plane, subsequently protruded, prominent; excipulary margin thin, usually white-pruinose; asci soon evanescent; spores naked, oblong or ovate, more or less constricted in the middle, bilocular, pale olive or yellowish-green; ·0015 to ·002 in. long, by ·001 in. broad.

Calicium curtum, Turn. and Borr. Lich. Brit. 148.—Sm. E. Bot. 2503.—Fries L. Ref. 387.—Hook. Brit. Fl. 2. 140.—De Not. Framm. 14.—Leight. Exs. 133.—Hepp Eur. 337!—*C. nigrum,* var. *curtum,* Schær. Enum. 169, L. H. 248!—Kbr. S. L. G. 308.—*C. quercinum,* var. *curtum,* Nyl. Calic. 19.

On old posts and pales, decayed trees, etc.; very common in mountainous districts, Its spermogones are not of unfrequent occurrence. They are subinnato-sessile, verrucæform, more or less prominent, solitary or confluent, black. The spermatia are very numerous, cylindrical, straight, ·001 in. long, by ·0001 in. broad.

2. CALICIUM QUERCINUM, *Pers.* Thallus thin, subtartareous, granulose or leprose, often scarcely visible, greyish-white. Apothecia minute, numerous, often crowded; stipes rather long, slender, rigid, black; capitula turbinato-lentiform, black, under side grey-pruinose; disc plano-convex, white-pruinose when young, afterwards naked; excipulary margin thin, slightly elevated; spores oblong or ovate, more or less constricted in the middle, bilocular, pale olive-green; ·0015 to ·0025 in. long, by ·001 to ·00125 in. broad.

Calicium quercinum, Pers. Tent. disp. Fung. Suppl. 59.—Nyl. Calic. 19. L. P. 14!—*Lichen clavellus,* Sm. E. Bot. 1465.—*Calicium clavellum,* Hook. Brit. Fl. 2. 139.—*C. lenticulare,* Fries. L. Ref. 386 in pt.—*C. lenticulare,* α. et γ. Schær. Enum. 168 in pt.—Kbr. S. L. G. 310.

On decayed oaks, old posts, pales, etc., in mountainous districts. Studley Park! Yorkshire, *W. Brunton, Esq.* Near Thirsk! *I. G. Baker, Esq.* Baysdale! and near Ayton! Cleveland. Its spermogones and spermatia are similiar to those of *C. curtum.*

3. CALICIUM POPULNEUM, *(De Brond.)* Thallus very thin, subleprous, smooth, cream-coloured. Apothecia very minute, scattered; stipes very short, slender, black; capitula subglobose or turbinato-lentiform; disc brownish-black, naked, slightly convex; asci and paraphyses subpersistent; spores linear-oblong, obovate, or elliptical, bilocular, or faintly bilocular, reddish-brown; ·003 to ·004 in. long, by ·001 to ·00125 in. broad. PLATE 4. *fig.* 104.

Calicium populneum, De Brondeau.—Schær. Enum. 170.—*C. curtum, β. populinum,* Hook. Brit. Fl. 2. 140.

On the trunks and branches of living poplars. Killarney! Ireland, in herb. *I. Carroll, Esq.* This is quite distinct from both the preceding. It may be known by its place of growth, diminutive size of its apothecia, subpersistent asci and paraphyses, and large reddish-brown spores.

4. Calicium hyperellum, *Ach.* Thallus effuse, granulated, often becoming pulverulent, greenish-yellow. Apothecia of a medium size, usually very numerous; stipes elongated, firm, black, somewhat polished near their base; capitula subhemispherical or turbinato-lentiform, under side reddish-brown when young, subsequently naked, black; disc brownish-black or black; excipulary margin thin, somewhat reflexed when mature; asci evanescent, subcylindrical, 8 spored; spores elliptical or oblong, the extremities rounded and obtuse, or attenuated and somewhat acute, more or less constricted in the middle, bilocular, pale olive-green, or greenish-yellow; ·002 to ·003 in. long, by ·001 in. broad. Plate 4. *fig.* 105.

Calicium hyperellum, Ach. Meth. 93.—Fries L. Ref. 389.—Hook. Brit. Fl. 2. 139.—Leight. Exs. 23!—De Not. Framm. 13.—Schær. Enum. 166, L. H. 241!—Kbr. S. L. G. 311.—Nyl. Calic. 16.—Hepp. Eur. 333!

On the trunks of old trees, especially oaks, alders, and limes; very common in mountainous districts. Readily known by its widely-spreading habit, greenish-yellow thallus, and numerous elongato-stipitate apothecia. Its spermogones are of common occurrence. They are minute, punctiform or subverrucæform, slightly prominent, black, irregularly scattered over the face of the thallus, solitary or confluent. The spermatia are excessively numerous, issuing in a dense cloud, broadly elliptical or subglobose, ·00012 to ·00016 in. in diameter.

5. Calicium tachelinum, *Ach.* Thallus exceedingly thin, often scarcely visible, filmy, subleprous, greyish-white. Apothecia of a medium size, tolerably numerous, scattered, at times crowded; stipes variously elongated, sometimes short and stout, at others more elongated and slender, black, somewhat polished near the base; capitula turbinato-lentiform, under side reddish-brown or rust-coloured when young, subsequently brownish-black; disc slightly convex, dark brown or black; asci soon evanescent; spores elliptical or oblong, the extremities rounded and often a little dilated, more or less constricted in the middle, bilocular, olive-green; ·002 to ·0025 in. long, by ·001 in. broad.

Calicium trachelinum. Ach. in V. A. H. 1816. p. 272. t. 8. f. 7.—Fries L. Ref. 390.—Hepp Eur. 160!—De Not. Framm. 12.—Kbr. S. L. G. 311.—Nyl. Calic. 18, L. P. 16!—*Lichen sphærocephalus*, Sm. E. Bot. 414.—*Calicium sphærocephalum*, Hook. Brit. Fl. 2. 141.—Leight. Exs. 270!—*C. hyperellum*, var. *salicinum*, Schær. Enum. 167, L. H. 243!

On the trunks of old dead trees, posts, pales, &c.; common in mountainous districts. The colour of the under side of the capitula, will prevent this species from being mistaken for either *curtum* or *quercinum;* and the colour of its thallus from *hyperellum*. Its spermogones are frequently present. They are very minute, punctiform, semi-immersed, black, solitary, scattered, usually most abundant next the circumference of the thallus. The spermatia are similar in both size and form to those of *hyperellum*.

6. Calicium subtile, *Pers.* Thallus exceedingly thin, often invisible, filmy, greyish-white. Apothecia minute, scattered; stipes short, slender, black; capitula minute, subglobose or turbinato-lentiform;

disc slightly convex, brownish-black; asci cylindrical, soon evanescent; spores oblong or ellipsoid, faintly bilocular, or unilocular, olive, or pale yellow; ·0015 in. long, by ·0005 to 00075 in. broad.

Calicium subtile, Pers. Tent. disp. Fung. Suppl. 60.—Fries L. Ref. 388.—Leight. Exs. 314!—Nyl. Calic. 21, L. P. 13!—*Lichen debilis,* Sm. E. Bot. 2462.—*Calic. debile,* Hook. Brit. Fl. 2. 141.—*C. lenticulare,* var. *subtile,* and *C. nigrum,* var. *pusillum,* Schær. Enum. 168. 169.—*C. pusillum.* Kbr. S. L. G. 308.—Hepp Eur. 338!

On the trunks of old decorticated dead trees, old timber, etc. Blackbeck, Baysdale! Cleveland, Yorkshire. This species may be known from *trachelinum,* by its diminutive apothecia and minute spores; from *populneum,* by its different habit, and size of its spores. Its spermogones are occasionally present. They are very minute, verrucæform, somewhat prominent, dark-brown when wet, black when dry, solitary, scattered. Its spermatia are tolerably numerous, oblong, or ellipsoid, ·00025 to ·0005 in. long, by ·00008 in broad.

GENUS 5. CYPHELIUM, (*Ach.*)

Apothecia stipitate, more or less turbinate or crateriform, becoming subglobose; excipulary margin thin, variously pruinose; thalamium arising from an excipulary simple hypothecium; asci very minute, numerous, clavæform, or cylindrical, soon evanescent; paraphyses filiform, capillary; spores spherical or ellipsoid, unilocular, or faintly bilocular, pale yellowish-brown; subsequently displayed as a naked pulverulent mass on the disc of the thalamium. Thallus crustaceous, uniform; often obliterated.

1. CYPHELIUM MELANOPHÆUM, (*Ach.*) Thallus effuse, thick, tartareous, granulato-conglomerate, yellowish-white or cream-colour. Apothecia of a medium size, irregularly scattered; stipes rather long, stout, black; capitula turbinate, somewhat polished; disc reddish-brown or rust-colour, occasionally protrudent; excipulary margin inflexed; spores very numerous, spherical, unilocular, pale brown, about ·001 in. in diameter.

Calicium melanophæum, Ach. in V. A. H. 1816. p. 276. t. 8. fig. 8.—Fries L. Ref. 391.—Schær. Enum. 171, L. H. 638!—Nyl. Calic. 14, L. P. 11!—Leight. Exs. 315!—*Cyphelium melanophæum,* α. Kbr. S. L. G. 314.

On the trunks of Scotch firs, decorticated oaks, &c. Eglestone! Durham, *Rev. J. Harriman.* Hoggarts wood! and Lounsdale! Cleveland, Yorkshire. Easily known by its thick granulated thallus.

CYPHELIUM TRICHIALE, (*Ach.*) Thallus effuse, thinnish, lobulato-granulose or crenato-squamulose, at first smooth, subsequently more or less pulverulent, grey or greyish-green. Apothecia rather small, numerous, scattered or crowded; stipes elongated, slender, brownish-black; capitula turbinate, becoming subglobose, under side cinereo-pruinose, at length naked, concolorous with the stipes; disc brown; spores very numerous, spherical, unilocular, pale brown or yellowish-brown; ·001 in. in diameter.

Calicium trichiale, Ach. L. Univ. 243.—Fries L. Ref. 389. Schær Enum. 172, L. H. 10! 11!—Nyl. Calic. 12.—*C. æruginosum,* Sm. E.

Bot. 2502 in pt.—Hook. Brit. Fl. 2. 141 in pt..—*Cyphelium trichiale,* De Not. Framm. 21.—Hepp Eur. 158 !—Kbr. S. L. G. 314.

On the trunks of old trees, timber, &c. Near Ludlow ! *Rev. T. Salwey.* Binnie woods, Haddingtonshire, *Dr. Maingay.* Ingleby ! Cleveland.

β. STEMONEUM, (*Ach.*) Thallus effuse, thinnish, leprous, dull white when growing in exposed situations, pale green when shaded. Apothecia of a medium size, usually rather distantly scattered; stipes variable in length, in some localities short and rather stout, in others elongated and slender, dark-brown ; capitula turbinato-lentiform, under side cinereo-pruinose, or nearly naked , disc pale brown, tumid ; excipulary margin obliterated ; spores very numerous, spherical, unilocular, yellowish-brown ; ·00075 in. in diameter.

Calicium stemoneum, Ach. in V. A. H. 1816. p. 278. t. 8. fig. 15. Schær. Enum. 174, L. H. 13 ! 249 !—Leight. Exs. 227 !—*C. trichiale,* b. Fries L. Ref. 389.—Nyl. Calic. 13, L. P. 12 !—*C. æruginosum,* Hook. Brit. Fl. 2. 141 in pt.—*Cyphelium stemoneum,* De Not. Framm. 19.—Kbr. S. L. G. 315.

On the trunks of old trees, decorticated oak stumps, &c. Bousdale Gill ! Newton Wood ! and near Ingleby ! Cleveland, Yorkshire.

γ. FERRUGINEUM, (*Turn. & Borr.*) Thallus thickish, granulato-conglomerate, at length subleprous, cream-colour, often tinged with yellow or red. Apothecia of a medium size, scattered or crowded ; stipes very short, more or less immersed in the thallus, dark-brown ; capitula subturbinate ; disc reddish-brown or rust-colour, at first flat, afterwards tumid, obliterating the thin excipulary margin ; spores spherical, unilocular, pale brown, about ·00075 in. in diameter. PLATE 4, *fig.* 106.

Calicium ferrugineum, Turn. & Borr. L. Brit. 156. E. Bot. 2473.—Hook. Brit. Fl. 2. 139.—*C. melanophæum,* var. *ferrugineum,* Schær. Enum. 172,—*Cyphelium melan.* var. Kbr. S. L. G. 314.—*C. trichiale,* var. Nyl. Calic. 13.

On the trunks of old decorticated trees, posts, pales, etc. Hoggarts Wood ! and Ingleby Greenhow ! Cleveland, Yorkshire. This is evidently only a variety of *trichiale.* Its chief distinguishing character is its very short stipes.

δ. BRUNNEOLUM, (*Ach.*) Thallus effuse, very thin, leprous, greenish or greyish-white, sometimes altogether obliterated. Apothecia small, numerous, scattered ; stipes elongated, filiform, slender, dark-brown or nearly black ; capitula turbinato-globose, reddish-brown or rust-colour ; disc convex, excluding the thin excipulary margin ; spores spherical, unilocular, pale brown ; ·00075 in. in diameter.

Calicium brunneolum, Ach. in V. A. H. 1816. p. 279. t. 8. fig. 12.—Fries L. Ref, 393.—Schær. Enum. 172.—Leight. Exs. 252 !—*C. trichiale,* var. Nyl. Calic. 14.—*Cyphelium brunneolum,* De Not. Framm. 21.—Kbr. S. L. G. 316.

On the trunks of old trees, dead wood, etc. On the trunk of an old Spanish-chestnut, near Busby Hall ! On alders, Ingleby Park ! On old decorticated trees, Baysdale ! and Stogdale ! Cleveland, Yorkshire. The thin, more or less evanescent, leprous thallus, elongated slender stipes, and small turbinato-globose brown or rust-coloured capitula, are the principal characters whereby this form may be recognised from the preceding ones.

3. CYPHELIUM CHRYSOCEPHALUM, *(Turn.)* Thallus thickish, granulato-conglomerate, bright greenish-yellow. Apothecia tolerably numerous, scattered; stipes elongated, slender, brownish-black or black; capitula turbinato-lentiform, at first yellowish-green-pruinose, afterwards nearly naked; disc brown, plane or slightly convex, spores rounded or ellipsoid, unilocular, olive-brown; ·0015 in. long, by ·001 in broad.

Lichen chrysocephalus. Turn. in Trans. Linn. Soc. 7. p. 88. t. 8. f. 1. —*Calicium chrysocephalum,* Ach. Syn. 60.—Sm. E. Bot. 2501.—Hook. Brit. Fl. 2. 140.—Fries L. Ref. 393.—Schær. Enum. 170, L. H. 12!—Leight. Exs. 134!—Nyl. Calic. 10, L. P. 10!—*Cyphelium chrysocephalum,* Kbr. S. L. G. 316.—De Not. Framm. 21.—Hepp Eur. 329!

On the trunks of old decorticated trees, posts, pales, etc. On park palings, Downton Castle! Herefordshire, ex herb. *Rev. W. A. Leighton.* On decorticated trees, Rosedale! Yorkshire, and in Baysdale! Cleveland. This is a very beautiful lichen, and one which may easily be recognised, by the colour of its thallus and large ellipsoid spores.

4. CYPHELIUM CITRINUM, *(Leight.)* Thallus obsolete, or none. Apothecia parasitic on the thallus of *Lecidea lucida;* stipes more or less elongated, stout, brown, subpulverulent; capitula globoso-lentiform; disc yellowish-brown, or brown, convex, excluding the thin excipulary margin; spores oblong, or ellipsoid, unilocular or faintly bilocular, pale brown; ·0015 to ·002 in. long, by ·0005 in. broad.

Coniocybe citrina, Leight. in Ann. Mag. Nat. Hist. 1857. p. 130. t. 8. fig. 7-9., Exs. 269!—Nyl. Calic. 34.

Parasitic on the thallus of *Lecidea lucida,* growing "on the under surface of stones in the walls of the turnpike road between Corwen and Bala!" North Wales, *Rev. W. A. Leighton.* As regards the remarks, by the gentleman just named, respecting the thallus and apothecia of *Lecidea lucida,* I think that the *Cyphelium* is only an alien on the thallus of the *Lecidea,* and the corpuscles figured by him (pl. 8. fig. 12-13) and supposed to be the spermogones and spermatia of the *Cyphelium,* I am inclined to consider as the apothecia and spores of the *Lecidea;* the structure of spermogones is generally of a different character. The *Lecidea* in question is very common in this neighbourhood, but as yet I have never observed the least trace of the *Cyphelia* on its thallus.

5. CYPHELIUM PHÆOCEPHALUM, *(Turn. and Borr.)* Thallus somewhat thick, granulated or subsquamuloso-crenate, pale olive-brown. Apothecia minute, numerous; stipes rather short, slender, somewhat polished, brownish-black; capitula turbinato-lentiform, greenish-yellow pruinose; disc dark-brown, plane or slightly convex; spores spherical, unilocular, pale brown; ·001 in. in diameter.

Calicium phæocephalum, Turn. and Borr. L. Brit. 145.—Fries L. Ref. 394.—Hook. Brit. Fl. 2. 140.—Schær. Enum. 171.—Nyl. Calic. 11.—*Lichen trabinellus,* Sm. E. Bot. 1540.—*Cyphelium phæocephalum,* Kbr. S. L. G. 317.

On old boarded buildings, etc. Near Norwich! *D. Turner, Esq.* This differs from the following species, by its distinct granuloso-subsquamulose thallus, and form of its capitula.

6. CYPHELIUM CHLORELLUM, (*Wahlb.*) Thallus very thin, filmy, subleprous, greyish-brown; often evanescent, or wanting. Apothecia very minute, numerous, at times densely crowded; stipes short, very slender, dark-brown, occasionally slightly green-pruinose; capitula minute, obconico-turbinate, greenish-yellow-pruinose; disc more or less protrudent, brown; spores spherical, unilocular, pale yellowish-brown; ·001 in. in diameter. PLATE 4. *fig.* 107.

Calicium chlorellum, Wahlb. in Ach. Meth. 95.—Hook. Brit. Fl. 2. 140.—Leight. Exs. 170!—*Lichen acicularis*, Sm. E. Bot. 2385.—*C. phæocephalum*, var. *chlorellum*, Fries L. Ref. 395.—Schær. Enum. 171. —*C. phæocephalum*, var. *aciculare*, Nyl. Calic. 12. L. P!—*Cyphelium chlorellum*, Kbr. S. L. G. 317.—Hepp. Eur. 328!

On the trunks of old trees, posts, etc. On oaks, Brantsdale! Yorkshire; Newton wood! and on decorticated hollies, Bousdale Gill! Cleveland.

GENUS 6. CONIOCYBE, (*Ach.*)

Apothecia stipitate, spherical, suberose, immarginate, when young enveloped in a spurious thin pulveraceous membrane, subsequently dehiscent, naked, pulverulent; thalamium arising from a very thin yellowish-brown hypothecium; asci indistinct; paraphyses filiform, capillary, mixed with the spores, which are free, spherical or globose, unilocular, subhyaline, constituting a pulveraceous mass on the apices of the stipes. Thallus crustaceous, uniform; at times obliterated.

1. CONIOCYBE FURFURACEA, (*L.*) Thallus effuse, granuloso-furfuraceous, becoming leproso-pulverulent, greenish-yellow or sulphur coloured. Apothecia of a medium size, numerous, scattered; capitula minute, globose, concolorous with the stipes when young, subsequently pale brown; stipes elongated, slender, sulphureo-pulverulent, becoming bluish-black; spores globose, unilocular, pale yellowish-brown; ·00075 in. in diameter. PLATE 4. fig. 108.

Mucor furfuraceus, L.—*Lichen capitatus*, Schreb.—Sm. E. Bot. 1539.—*Calicium furfuraceum*, Pers.—Hook. Brit. Fl. 2. 142.—*Coniocybe furfuracea*, Fries L. Ref. 382.—Leight. Exs. 225!—Schær. Enum. 175, L. H. 14!—Kbr. S. L. G. 318.—Nyl. Calic. 24.

b. FULVA, (*L.*) Stipes short, somewhat stout; otherwise as above.

Mucor fulvus, L.—*Coniocybe furfuracea*, b. *fulva*, Fries L. Ref. 382. Schær. Enum. 175, L. H. 296!

c. SULPHURELLA, (*Wahlb.*) Thallus very thin, greyish-white, often obsolete. Capitula constantly sulphureo-pulverulent; stipes short; otherwise as above.

Coniocybe furfuracea, var. *sulphurella*, Wahlb.—Fries L. Ref. 382.—Schær. Enum. 175, L. H. 639!—Hepp Eur. 154!—Nyl. Calic. 25, L. P. 7!

On old decayed trees, and occasionally on the ground in sandy places. On the ground, near Edinburgh! *Dr. Maingay.* On old trees, Brantsdale! Yorkshire.

2. CONIOCYBE PALLIDA, (*Pers.*) Thallus very thin, leproso-pulverulent, white, often obsolete. Apothecia of a medium size, numerous; capitula sublentiform or globose, white-pulverulent, becoming cinnamon

coloured; stipes of a medium length, stout, pale brown, white-pulverulent, subsequently naked; spores globose, unilocular, hyaline; ·00125 in. in diameter.

Calicium pallidum, Pers.—*C. cantharellum*, Ach. Syn. 61.—Sm. E. Bot. 2557.—*Coniocybe pallida*, Fries L. Ref. 383.—Schær. Enum. 174, L. H. 7!—Hepp Eur. 155!—De Not. Framm. 20.—Nyl. Calic. 26. C. *stilbea*, Kbr. S. L. G. 319.—*Calicium peronellum*, Hook. Brit. Fl. 2. 141.

On old decayed trees in mountainous districts. Teesdale! Durham, *Rev. J. Harriman.* Clougha! Lancashire, *Mr. R. Jacob.*

DIV. 2. ANGIOCARPI, (*Fries.*)

Apothecia normally closed, subglobose, nucleiferous; nucleus enveloped in a simple or compound tunic, either entirely formed of the thallus, or of a distinct substance, perforated at the apex by a simple pore, or irregularly dehiscent.

The species constituting this division are distinguished essentially by the form and structure of their apothecia, which are typically globose or hemispherical, seated on the superior surface of the thallus, or more or less immersed in its substance. In structure they differ from the thalamiferous or disciform apothecia, by being enveloped, or partly enveloped, in a shell or outer covering, (*perithecium*) composed of the same elements as the thallus, or distinct from it. This shell is generally lined with a thin tunic of a different colour, mostly white or colourless, occasionally pale brown; it entirely envelopes the nucleus, which is usually pale, more or less gelatinous, consisting of hyaline paraphyses or a mucilaginous substance, asci, and spores. The superior part of the perithecium is ordinarily slightly depressed and subsequently perforated with a minute pore, or irregularly dehiscing, (*ostiolum*) from whence the spores are discharged.

TRIBE 1. SPHÆROPHORACEÆ, (*Fries.*)

Thallus vertical, fruticulose. Apothecia formed of the swollen extremities of the thallus, closed, at length irregularly lacerato-dehiscent; nucleus subglobose.

GEN. 1. SPHÆROPHORON, (*Pers.*)

Apothecia terminal, spherical; thallodal receptacle at first closed, subsequently irregularly lacerato-dehiscent; nucleus globose or globoso-depressed, floccoso-cartilaginous, bluish-black; asci elongato-cylindrical, attenuated at the base, each containing 8 spores; spores oblong or globose, normally bluish-black. Thallus fruticulose.

1. **SPHÆROPHORON CORALLOIDES**, (*Pers.*) Thallus fruticulose, suberect or ascending, lax, brownish-olive, unequally and irregularly

branched, subcylindrical; lateral branches numerous, small, compound fibrillose, pale brown or cream-colour. Apothecia terminal on the main branches, globose, closed, subsequently irregularly lacerato-dehiscent; asci elongato-cylindrical, 8 spored; spores oblong or subrotund, of a bright indigo-blue colour. hyaline when empty; ·00175 in. long, by ·001 to ·0015 in. broad. PLATE 5. fig. 109.

Sphærophorus coralloides, Pers.—Hepp Eur. 217!—*Lichen globiferus*, Sm. E. Bot. 115.—*Sphærophoron coralloides*, Fries L. Ref. 405.—Schær. Enum. 177, L. H. 453!—Nyl. Enum. Gen. 93.—Kbr. S. L. G. 52.—*S. coralloides*, *α. laxum*, Hook Brit. Fl. 2. 232.—Leight. Brit. Angi. Lich. 7. pl. 1. fig. 1., Exs. 316!

β. FRAGILE, (*L.*) Thallus densely cæspitose, dichotomously branched, greyish-white or pale brown; branches subcylindrical, fastigiate, naked, not fibrillose. Apothecia and spores similar to those of *coralloides*.

Lichen fragilis, L.—Sm. E. Bot. 2474.—*Sphærophoron fragile*, Ach. L. Univ. 585.—Fries. L. Ref. 405.—Schær. Enum. 176, L. H. 15!—Kbr. S. L. G. 51!—Nyl. Enum. Gen. 93.—*S. coralloides*, *β. cæspitosum*, Hook. Brit. Fl. 2. 232.—Leight. Brit. Angi. Lich. 8. pl. 1. fig. 2.

On rocks, walls, &c. in mountainous districts; common. The character which distinguishes *fragile* from *coralloides* is the absence of the minute compound lateral fibrillose branches. The spermogones are not of unfrequent occurrence. They are usually seated on the apices of the sterile branches, or on the tips of the small lateral fibrillæ, with which the main branches are to a greater or less extent clothed, tuberculiform, solitary, grouped, their apices more or less flattened, dark-brown, nearly black when old. The spermatia are exceedingly numerous, issuing in a dense cloud when a spermogone is placed in a drop of water, between glass slides, and subjected to a gentle pressure; individually they are ellipsoid or subcylindrical, srtaight, ·0005 to ·00075 in. long, by ·00016 to ·00012 in. broad.

2. *Sphærophoron compressum*, Ach. Thallus fruticulose, erect, irregularly branched, glaucous or greyish-white; branches compressed, much divided, somewhat articulated, naked, or partly clothed with minute lateral fibrillæ. Apothecia terminal, oblique, globoso-depressed, closed when young, afterwards lacerato-dehiscent, subdisciform; asci elongato-cylindrical, 8 spored; spores round, normally bluish-black; ·0015 to ·00175 in. in diameter.

Sphærophoron compressum, Ach. L. Univ. 586.—Fries L. Ref. 404.—Hook. Brit. Fl. 2. 232.—Leight. Brit. Angi. Lich. 9. pl. 1. fig. 3.—Kbr. S. L. G. 52.—Nyl. Enum. Gen. 93.—*Lichen fragilis*, Sm. E. Bot. 114.—*S. melanocarpos*, Schær. Enum. 177.

On rocks in alpine or subalpine districts. Falcon Clints! Teesdale, *J. G. Raker, Esq.* High-green wood! Heptonstall, Yorkshire, *Dr. Carrington*. Cournemara! Ireland, *D. Moore, Esq.* Farndale! Yorkshire, and Hobhole! Cleveland. The compressed branches, and the terminal oblique globoso-depressed apothecia, are the chief distinguishing characters of this species. The spermogones are apparently not so frequently produced in this as in the preceding species; they differ somewhat in site, being mostly on the under side of the margins of the principal or fertile divisions of the thallus, but they also occur, now and then, on the tips of the small fibrillæ. Their internal contents are similar.

TRIBE 2. ENDOCARPEÆ, (*Fries.*)

Thallus horizontal, foliaceous, squamulose, or squamuloso-crustaceous. Apothecia at first entirely imbedded and enclosed in the thallus; nucleus globose, enveloped in a thallodal, or a proper membranaceous tunic, becoming at length slightly elongated and attenuated upwards into an obtuse neck, prominent, and eventually perforated by a minute regular pore.

GEN. 1. ENDOCARPON, (*Hedw.*)

Apothecia imbedded in the thallus, globose; nucleus pale, gelatinous, enveloped in a pale membranaceous tunic; ostiolum prominent, pale brown or brownish-black, eventually perforated by a minute regular pore; asci subclavate, 8 spored; paraphyses indistinct; spores elliptical or elliptical-oblong, unilocular, subhyaline or hyaline. Thallus horizontal, cartilaginous, foliaceous, or squamulose; under side naked or fibrillose.

SECT. A.—*Thallus foliaceous, subpeltate.*

1. ENDOCARPON MINIATUM, (*L.*) Thallus cartilagineo-coriaceous, rigid, submonophyllus, umbilicated, olive-green when growing and in a moist state, more or less tinged with red and pruinose when dry; under side naked, fulvous, at length somewhat rugulose. Apothecia minute, very numerous, scattered, imbedded in the thallus; ostiola slightly elevated above the level of the thallus, pale brown, changing to dark-brown, eventually perforated by a simple pore; asci subclavate, 8 spored; spores oblong or ovate, unilocular, filled with a finely granular or grumous protoplasm, subhyaline; ·00275 to ·00325 in. long, by ·00125 in. broad.

Guernsey
Serk.

Lichen miniatus, L.—Sm. E. Bot. 593. fig. sup.—*Endocarpon miniatum*, α. Ach. L. Univ. 302.—Fries L. Ref. 408.—Hook. Brit. Fl. 2. 156.—Tayl. Fl. Hib. pt. 2. 98.—Schær. Enum. 231, L. H. 112!—Leight. Brit. Angi. Lich. 11. pl. 1. fig. 4. Exs. 26!—Hepp Eur. 218!—Massal. Ric. 183. fig. 371.—Kbr. S. L. G. 100.—Nyl. Syn. Pyren. 11. Enum. Gen. 135.

On the perpendicular face of dry rocks in alpine districts. Diganwy! near Conway, Caernarvonshire, *Rev. W. A. Leighton.* Rokeby! Durham, *G. Dixon, Esq.* Tenby Castle! Pembrokeshire, *Miss M. Atwood.* Hilks Wood! Ingleborough, *Dr. Carrington.* Near Settle! *Dr. Windsor.* The spermogones are usually present, but on account of their resemblance to young apothecia they are not distinguishable unless dissected; they are very minute, punctiform, immersed in the substance of the thallus, scattered, intermixed with the apothecia; ostiola pale brown, slightly elevated. The spermatia are very abundant, cylindrical, straight, ·001 in. long, by ·00012 in. broad.

β. COMPLICATUM, (*Swartz.*) Thallus cæspitose, polyphyllus; lobes ascending, imbricated and complicate, greyish-brown; under side dark brown; otherwise as in the normal form.

Lichen complicatus, Swartz.—*L. miniatus*, Sm. E. Bot. 593. fig. inf. —*Endocarpon miniatum*, β. *complicatum*, Fries L. Ref. 408.—Hook.

Brit. Fl. 2. 156.—Schær. Enum. 232, L. H. 113!—Leight. Brit. Angi. Lich. 11. pl. 2. fig. 1. Exs. 167!—Massal. Ric. 183. fig. 373.—Hepp Eur. 218, b.!—Kbr. S. L. G. 100.—Nyl. Syn. Pyren. 12.

On rocks which are exposed to the spray of water-falls, or occasionally inundated. Falcon Clints! Teesdale, Durham. The spermogones are apparently much more abundantly produced in this variety than in the normal form, the thallus being often nearly covered with them; their internal structure and contents are similar.

γ. LEPTOPHYLLUM, (*Ach.*) Thallus submonophyllus, minute, peltate, the circumference flexuose and more or less lobed, of a greyish or dark-brown colour; under side naked, rugulose, brownish-black. Apothecia as in the normal form; spores elliptical, unilocular, subhyaline or hyaline; ·0025 to ·003 in. long, by ·0015 in. broad.

Lichen leptophyllus, Ach. Prod. 141.—Sm. E. Bot. 2012. fig. 2. *Endocarpon leptophyllum*, Ach. L. Univ. 302.—Hook. Brit. Fl. 2. 157.—Leight. Brit. Angi. Lich. 12. pl. 2. fig. 2.—*E. miniatum*, c. *leptophyllum*, Fries. L. Ref. 408.—Schær. Enum. 232.—Kbr. S. L. G. 100.—Nyl. Syn. Pyren. 12.

On moist rocks. Llyn Bodlyn! Merionethshire, *Rev. T. Salwey*. This seems to me to be only a diminutive state of *miniatum*.

2. ENDOCARPON FLUVIATILE, (*DC.*) Thallus membranaceo-coriaceous, cæspitose, polyphyllus, flaccid, bullato-lobed in the centre, explanate at the circumference, green when wet, glaucous-brown when dry; under side naked, at first pale brown, afterwards brownish-black. Apothecia minute, imbedded in the thallus; ostiola slightly prominent, pale brown, changing to brownish-black, eventually perforated by a minute simple pore; asci subclavate, 8 spored; spores elliptical-oblong, unilocular, subhyaline or hyaline; ·0025 to ·003 in. long, by ·00125 in. broad.

Endocarpon fluviatile, DC. Fl. Fr. 2. 413.—Fries L. Ref. 409.—Kbr. S. L. G. 101.—Massal. Ric. 185.—Nyl. Syn. Pyren. 12.—*Lichen aquaticus*, Sm. E. Bot. 594.—*E. miniatum*, var. *aquaticum*, Hook. Brit. Fl. 2. 156.—Schær. Enum. 232, L. H. 114!

On rocks and stones in subalpine rivers. River Tees near Eglestone! Durham, *Rev. J. Harriman*. River Teegn! Devonshire, *Mr. E. Parfitt*.

β. EUPLOCUM, (*Ach.*) Thallus coriaceous, minute, umbilicato-monophyllus, deeply lobed; lobes laciniated, the margins crisped and recurved, olive-green when moist, greyish-brown when dry; under side fulvous. Apothecia and spores as in *fluviatile*.

Endocarpon epulocum, Ach. L. Univ. 301.—Hook. Brit. Fl. 2. 157.—Leight. Brit. Angi. Lich. 12. pl. 2. fig. 3.—Schær. Enum. 232.—*Verrucaria euploca*, Borr. in E. Bot. Suppl. 2602. fig. 2.—*E. fluviatile*, b. Fries L. Ref. 409.

On rocks exposed to the action of the tide on the shore of the Tyne, West of Newcastle! *Mr. W. Robertson*. This apparently bears the same relation to *fluviatile* as *leptophyllum* does to *miniatum*; indeed the whole five forms seem to me to be closely allied to each other, and their separation doubtful.

SECT B.—*Thallus adherent, squamulose.*

3. ENDOCARPON PSOROMOIDES, (*Borr.*) Thallus subtartareo-membranaceous, squamulose, dull olive-green when wet, greyish-brown when dry; under side black, spongy; squamules crowded, variously tumid, undulated, and contorted, the circumferencial ones roundly lobed of a paler colour and slightly elevated. Apothecia minute, imbedded in the thallus, subglobose, pale; ostiola slightly prominent, pale brown changing to dark-brown, subsequently perforated by a simple very minute pore; nucleus gelatinous, subconglutinate, white; paraphyses indistinct; asci sublanceolate, 8 spored; spores elliptical-oblong or obovate, unilocular, subhyaline or hyaline; ·0025 to ·003 in. long, by ·001 in. broad. PLATE 5. *fig.* 110.

Verrucaria psoromoides, Borr. in E. Bot. Suppl. 2612. fig. 1.—*Endocarpon psoromoides*, Hook. Brit. Fl. 2. 157.—Schær. Enum. 234, L. H. 599!—Massal. Ric. 182. fig. 370.—*Phacopsis psoromoides*, Hepp Eur. 475! fig. 1.

On the trunks of trees, especially elms and limes. On elm at Hurstpierpoint! Sussex; in herb. *Rev. W. A. Leighton*! According to HEPP the quadrilocular coloured spores, figured by LEIGHTON in his Brit. Angi. Lich. pl. 2. fig. 4 are those of *Sphæria urceolata*, (*Endocarpon urceolatum*, Schær. Enum. 233.—*Decampia Engeliana*, Kbr. S. L. G. 326.) which occurs as a parasite on the thallus of *E. psoromoides* and that of *Solorina saccata*. The specimens which I examined, from the locality given above, did not contain the least trace of the parasitic *Sphæria*, the apothecia and spores being constantly as I have described them. The specimens in SCHÆRER'S L. H. 599! and those in HEPP'S Eur. 475! 1. are identical with our plant. HEPP apparently regards the thallus of the species in question as that of *Lecanora verrucosa*, *β. mutabilis*, and the apothecia as a *Phacopsis*. This view is evidently erroneous, as the structure of the apothecia in the *present genus* and *Phacopsis* are totally different.

4. ENDOCARPON RUFESCENS, *Ach.* Thallus coriaceous, squamulose, reddish-brown; under side brownish-black, fibrillose; squamules undulato-lobed, distinct and scattered, or congregated together and somewhat imbricated, the margins elevated and free, or appressed and adnate. Apothecia minute, imbedded in the thallus; ostiola protruded, slightly prominent, brownish-black, eventually perforated by a simple pore; asci subclavate, 8 spored; spores elliptical-oblong, or ovate, unilocular, subhyaline or hyaline; ·0035 to ·004 in. long, by ·00125 to ·0015 in. broad.

Endocarpon rufescens, Ach. L. Univ. 304.—Hepp Eur. 219!—Nyl. Syn. Pyren. 14.—*Lichen lachneus*, Sm. E. Bot. 1698 et *L. leptophyllus*, E. Bot. 2012.—*Endocarpon lachneum*, Ach. L. Univ. 299 in pt.—Leight. Brit. Angi. Lich. 14 pl. 3. fig. 2.—Tayl. Fl. Hib. pt. 2. 99.—*E. pusillum*, b. Fries L. Ref. 411.—Schær. Enum. 234, L. H. 465!—*E. Hedwigii*, *β. lachneum*, and *γ. squamulosum*, Hook. Brit. Fl. 2. 156. 157.—*Endopyrenium rufescens*, Kbr. S. L. G. 323.

On the ground in barren places, in the crevices of rocks, etc. Ben Bulben! *Professor Dickie.* Near Bristol! *Miss M. Atwood.* Ben Lawers! *Dr. Maingay.* Highlands *Admiral Jones.* Malham! Yorkshire, *Dr. Carrington.* Cave Hill! Belfast, *D. Moore, Esq.*

5. Endocarpon pusillum, *Hedw.* Thallus cartilaginous, squamulose, smooth, greenish-olive when recent, olive-brown or dark-brown in the herbarium; under side pale, brown-fibrillose; squamules thin, appressed, usually distinct and scattered, entire or slightly rotundato-lobed. Apothecia minute, imbedded in the thallus; ostiola emergent, subprominent, brownish-black, subsequently perforated by a minute simple pore; asci oblongo-clavate, 8 spored; spores elliptical-oblong or obovate, unilocular, subhyaline or hyaline; ·0025 to ·003 in. long, by ·001 to ·00125 in. broad

Endocarpon pusillum, Hedw.—Tayl. Fl. Hib. pt. 2. 99.—Massal. Ric. 185. fig. 379 in pt.—Hepp Eur. 220!—*Lichen trapeziformis*, Sm. E. Bot. 595.—*E. hepaticum*, Ach. L. Univ. 298.—Nyl. Syn. Pyren. 15.—*E. pusillum*, α. Fries L. Ref. 411.—Schær. Enum. 234, L. H. 115! in pt.—Kbr. S. L. G. 323.—*E. Hedwigii*, Hook. Brit. Fl. 2. 156.—Leight. Brit. Angi. Lich. 14. pl. 3. fig. 3. Exs. 135!

On the ground in barren places, old mud-capped walls, etc. Walls of Moor Park! Herefordshire, *Rev. W. A. Leighton.* Penzance! *Rev. T. Salwey.* Walls of Tenby Castle! Pembrokeshire, *Miss M. Atwood.* This species may be known from the preceding by the squamules being thinner, closer appressed, more scattered, and of a greener colour.

6. Endocarpon cinereum, *Pers.* Thallus membranaceous, closely adherent, areolato-crustaceous in the centre, subfoliaceous at the circumference, greyish-brown, more or less white-pruinose; under side spongy, black. Apothecia minute, imbedded in the thallus, globose; nucleus pale, gelatinous, enveloped in a thin membraneous tunic; ostiolum attenuated into a slender neck, dark-brown, prominent, dilated, and subsequently perforated by a simple pore; asci subclavate, 8 spored; spores elliptical-oblong, unilocular, at times sub-bilocular, subhyaline, or hyaline; ·003 to ·004 in. long, by ·0015 to ·00175 in. broad.

Endocarpon cinereum, Pers.—Schær. Enum. 235, L. H. 647!—Hepp Eur. 221!—Massal. Ric. 185. fig. 378.—*Lichen tephroides*, Sm. E. Bot. 2013.—*Endocarpon tephroides*, Ach. L. Univ. 297.—Hook. Brit. Fl. 2. 159.—*Sagedia cinerea*, Fries L. Ref. 413.—Leight. Brit. Angi. Lich. 22.—*Catopyrenium cinereum*, Kbr. S. L. G. 325.—*Verrucaria tephroides*, Nyl. Syn. Pyren. 17.

On the ground in alpine districts. Ben Lawers! *Admiral Jones.* Malham! *Dr. Carrington.* The internal contents of the spores of this species occasionally assume a bilocular form, from the collapsing of the protoplasm with which they are filled, into one or two globules or nuclei.

Gen. 2. Normandina, *Nyl.*

"Apothecia solitary, very rarely produced, subglobose, enclosed in the thallus; asci clavate, 8 spored; spores oblongo-cylindrical, 8 locular, pale yellow." Thallus squamulose; squamules thin, membranaceous, rotundato-discoid.

1. Normandina jungermanniæ, *(Del.)* Thallus squamulose, membranaceous; squamules smooth, glaucous-green, rounded or rotundato-lobed, distinct and separate, or crowded and somewhat imbricated; margins elevated, reflexed and slightly pulverulent, white. "Apothecia

(rarely produced) enclosed in the thallus, subglobose, subsequently erumpent, the apex prominent, dark-brown; nucleus pale, enveloped in a distinct black tunic; spores oblongo-cylindrical, 8 locular, pale yellow."

Lenormandia jungermanniæ, Del.—Nyl. L. P. 89!—Hepp Eur. 476! in pt.—*Verrucaria pulchella,* Borr. E. Bot. Suppl. 2602. fig. 1.—*Endocarpon pulchellum,* Hook. Brit. Fl. 2. 158.—Leight. Brit. Angi. Lich. 13. pl. 3. fig. 1.—*Normandina jungermanniæ,* Nyl. Syn. Pyren. 10.

On the mossy trunks of trees. Overrunning *Jungermannia dilatata,* Tollymore Park! Co. Down, Ireland, *Dr. Maingay.* I have never seen either the apothecia or the spermogones of this species.

2. NORMANDINA VIRIDIS, (*Ach.*) Thallus squamulose, membranaceous; squamules smooth, grass-green when growing, greenish-olive in the herbarium, at first orbicular, concave, subsequently nearly flat, more or less sinuated and rotundato-lobed, usually crowded and imbricated; under side white, adnate and fibrous in the centre, free elevated naked and slightly reflexed at the circumference. Apothecia. . . . . . . ?

Endocarpon viride, Ach. L. Univ. 300.—*Verrucaria lætevirens,* Borr. E. Bot. Suppl. 2658.—*Endocarpon lætevirens,* Hook. Brit. Fl. 2. 158.—Leight. Brit. Angi. Lich. 12. Exs. 25!—*Solorina saccata,* b. Schær. Enum. 23.—*Lenormandia jungermanniæ,* Hepp Eur. 476! in pt.—*Normandina viridis,* Nyl. Syn. Pyren. 11.

On the ground in barren places on heaths, on moss in bogs, etc. Sychnant! near Conway, Caernarvonshire, *Rev. W. A. Leighton.* Ben Lawers! *Dr. Maingay.* Doneraile Mountains! Ireland, *I. Carroll, Esq.* Battersby Bank! and Ingleby Moor! Cleveland. This is closely allied to the preceding and is probably only a terricole variety of it. Indeed it is retained as distinct, solely, on account of the total absence of fruit.

GEN. 3. DERMATOCARPON, (*Esch.*)

Apothecia solitary, globose or subglobose, at first enclosed in the thallus, afterwards partly emersed; apices prominent, subsequently perforated by a simple pore; nucleus pale, subgelatinous, enveloped in a proper dark-brown or black tunic; paraphyses indistinct; asci obovato-clavate or obovato-ventricose, 2 or 8 spored; spores oblong or elliptical-oblong, muriform-multilocular, coloured. Thallus squamuloso-crustaceous, or crustaceous.

1. DERMATOCARPON PALLIDUM, (*Ach.*) Thallus cartilaginous, squamuloso-foliaceous, smooth, somewhat imbricated, lobed and crenate, pale greenish-grey; under side somewhat spongy and black in the centre, pale and naked at the circumference. Apothecia minute, immersed in the thallus, subglobose, their apices at length protruded, prominent, brownish-black, eventually perforated by a simple pore; asci 2 spored; spores oblong or linear-oblong, muriform-multilocular, pale yellowish-brown; ·008 to ·009 in long, by ·0025 to ·003 in. broad.

Endocarpon pallidum, Ach. L. Univ. 301.—Leight. Brit. Angi. Lich. 19. pl. 5. fig. 3.—Hook. Brit. Fl. 2. 157.—*Lichen pallidus,* Sm. E. Bot. 2541.—*E. pusillum,* c. *pallidum,* Fries L. Ref. 411.—Schær. Enum. 234.—*Verrucaria pallida,* Nyl. Syn. Pyren. 20.

"On rocks thinly covered with earth, Ireland, *Sir T. Gage.*" I have not seen any specimens of this species.

2. Dermatocarpon Garovaglii, (*Montagn.*) Thallus coriaceo-cartilaginous, squamuloso-crustaceous, adnate, except at the circumference of the squamules, where they are slightly elevated, somewhat lobed, and crenate, pale olive-brown or olive-green; under side greyish-brown, somewhat spongy. Apothecia minute, immersed in the thallus, subglobose, their apices at length emersed, prominent, naked, black, eventually perforated by a simple pore; nucleus pale, subgelatinous; asci clavato-saccate, 2 spored; spores oblong or obovate, muriform-multilocular, pale yellowish-brown ·008 to ·011 in. long, by ·00275 to ·0035 in. broad. Plate 5. fig. 111.

Verrucaria Garovaglii, Montagn.—Nyl. Syn. Pyren. 20. L. P. 90!—*V. sorediata,* Borr. E. Bot. Suppl. 2612. fig. 2.—*Endocarpon sorediatum,* Hook. Brit. Fl. 2. 158—Leight. Brit. Angi. Lich. 18. pl. 5. fig. 2.—*E. Garovaglii,* Schær. Enum. 234.—*Thelotrema Schæreri,* Hepp Eur. 100!—*Dermatocarpon Schæreri,* Kbr. S. L. G. 236.

On the ground; "Rottingdean Cliffs! Sussex, *Mr. Borrer.*" I have never seen British specimens of the present species. The attributed sorediiferous aspect of the apothecia is not a constant character.

3.? Dermatocarpon isidioides, (*Borr.*) Thallus effuse, thick, tartareo-crustaceous, rimoso-areolate, yellowish-brown. Apothecia of a medium size, immersed in tumid thallodal verrucæ, subglobose, their apices at length slightly emersed, dark-brown; nucleus pale, yellowish-brown, subgelatinous; asci oblongo-ventricose or elongato-clavate, 8 spored; spores oblong or obovate, muriform-multilocular, yellowish-brown; ·007 to ·009 in. long, by ·003 to ·004 in. broad.

Verrucaria isidioides, Borr. E. Bot. Suppl. 2622. fig. 1.—*Pertusaria.* Hook. Brit. Fl. 2. 160.—*Endocarpon.* Leight. Brit. Angi. Lich. 20. pl. 6. fig. 4.

On rocks. Ireland! in herb. *I. Carroll, Esq.* This is a somewhat anomalous species. It resembles a *Sphærompale* in its external appearance, and in the internal organization of its spores, while the apothecia are of a similar structure to those of the two preceding species. I am doubtful as to the genus in which it ought to be placed, and leave it here for the present only.

* Gen. 4. Decampia, (*Massal.*)

Apothecia solitary, ampullæform, immersed in the thallus, their apices at length emersed, prominent, perforated; nucleus pale, gelatinous, enveloped in a carbonaceous black proper tunic; asci elongato-cylindrical, 8 spored, uniserial; spores subelliptical or broadly fusiform, slightly constricted in the middle, normally quadrilocular, dark bright-brown. Thallus subtartareous, lobulato-effigurate.

* 1. Decampia Hookeri, (*Borr.*) Thallus determinate, orbicular, subtartareous, white or cream-colour, rugoso-plicate in the centre, sublobulate at the circumference. Apothecia minute, immersed in the thallus, ampullæform, black, their apices at length emersed, prominent, truncate, subsequently perforated by a simple pore; asci elongato-

cylindrical, 8 spored; spores subelliptical or broadly fusiform, more or less constricted in the middle, normally quadrilocular, at times 6 locular, and at others submuriform-multilocular, dark bright-brown; ·006 to ·007 in. long, by ·0025 to ·003 in. broad. PLATE 5. *fig.* 112.

Verrucaria Hookeri, Borr. E. Bot. Suppl. 2622. fig. 2.—Hook. Brit. Fl. 2. 155.—Leight. Brit. Angi. Lich. 64. pl. 27. fig. 5. Exs. 318!—*Lecidea Hookeri,* Schær. Enum. 102. L. H. 526!—*Decampia Hookeri,* Kbr. S. L. G. 326.

On the ground, and on dead mosses, in alpine districts. Ben Lawers! *Dr. Maingay.* Highlands! *Admiral Jones.* The specimen issued by *Schærer* in his L. H. 526 as *Lecidea Hookeri,* in my copy, is identical with the species just described. Is this plant a true *Lichen?*

TRIBE 3. PERTUSARIEÆ. (*Kbr.*)

Thallus adnate, membranaceo-crustaceous, uniform, often becoming sorediiferous, or isidiiferous. Apothecia verrucæform, formed of the thallus; each verruca containing one or more subglobose ceraceo-gelatinous nuclei, which are enveloped in a distinct proper membranaceous tunic; ostiola slightly depressed, subsequently perforated by a regular pore, or irregularly dehiscent.

GENUS 1. PERTUSARIA, (*DC.*)

Apothecia verrucæform, normally covered by the cortical stratum of the thallus; each verruca containing one or more gelatinous nuclei; ostiola punctiform and subprominent, or punctiform and depressed, at times becoming subdisciform; nucleus gelatinous, pale, imbedded in the medullary stratum, enveloped in a pale subceraceous or membranaceous tunic; paraphyses very fine and delicate, flaccid; asci elongato-cylindrical, saccate, or clavato-ventricose, 1, 2, 4, 6, or 8 spored; spores very large, elliptical-oblong, unilocular, pale yellow or yellowish-brown, each enclosed in a hyaline double membrane. Thallus crustaceous, uniform.

SECT. 1. *Saxicolæ.*

1. PERTUSARIA CEUTHOCARPA, (*Sm.*) Thallus determinate, cartilagineo-tartareous, areolate, smooth, cream-coloured, surrounded at the circumference by a dark-olive zonate hypothalline margin. Fertile verrucæ subglobose, smooth, cæspitoso-confluent; ostiola minute, papillato-prominent or depressed, brownish-black; nucleus pale flesh-colour; asci cylindrico-saccate, 2 spored; spores elliptical-oblong, unilocular, pale yellow, enveloped in a hyaline double membrane; ·029 to ·035 in. long, by ·011 to ·015 in. broad, including the double membrane.

Lichen ceuthocarpus, Sm. E. Bot. 2372.—*Pertusaria ceuthocarpa,* Hook. Brit. Fl. 2. 160.—Leight. Brit. Angi. Lich. 28. pl. 9. fig. 4. Exs. 284! et 342!—Kbr. S. L. G. 387.—Nyl. Enum. Gen. 116.

b. VARIOLOSA. Thallus as above. Verrucæ sterile, transformed into white pulverulent soredia.

Pertusaria ceuthocarpa, var. Leight. Exs. 341!

On rocks in mountainous districts. Dunkerron Mountain! Ireland, *Dr. Taylor.* Near Bantry! *Miss Hutchins.* Barmouth! North Wales, *Rev. W. A. Leighton.* I feel uncertain whether the minute light-brown papillæ which occasionally occur on the thallus of this plant, and which have been hitherto regarded as *Isidium microsticticum,* are spermogones or a production foreign to *ceuthocarpa,* never having been able to find the least trace of either sterigmata or spermatia in my examinations.

2. PERTUSARIA RUPESTRIS, (*DC.*) Thallus subdeterminate, thick, tartareous, verruculoso-areolate, smooth and somewhat shining, yellowish cream-colour. Fertile verrucæ small, crowded, slightly convex and regular, or variously difformed, each containing one or two nuclei; ostiola punctiform, pale brown or brownish-black, eventually depressed; nucleus gelatinous, pale flesh-colour; asci clavato-saccate, one or occasionally two spored; spores elliptical-oblong, unilocular, pale yellow, enveloped in a hyaline double membrane; ·031 to ·034 in. long, by ·011 to ·013 in. broad.

Pertusaria communis, β. rupestris, DC. Fl. Fr. 2. 320.—*P. rupestris,* varr, *discoidea,* and *isidioidea,* Schær. Enum. 227, L. H. 592! 593!—*P. rupestris,* Massal. Ric. 187. fig. 384.—Kbr. S. L. G. 382 in pt.

On rocks and stones in exposed situations. Holyhead! *Admiral Jones.* Walls, Ingleby Greenhow! Cleveland. This species resembles *areolata* in habit, but differs in the colour of its thallus, and by the fertile verrucæ being much smaller in size and more crowded. *Endocarpon sulphureum,* Tayl. Fl. Hib. pt. 2. 100, appears to me to be only the sorediiferous or variolose state of the present plant.

β. AREOLATA, (*Ach.*) Thallus subdeterminate, thickish, tartareous, somewhat shining, colliculoso-verrucose, rimoso-areolate, greyish-olive or grey, surrounded at the circumference by a dark-olive subzonate hypothalline margin. Fertile verrucæ subglobose, regular or variously difformed, smooth, each containing one, two, or more nuclei; ostiola small, depressed, brownish-black; nucleus gelatinous, pale; asci clavato-saccate, 2 spored; spores elliptical-oblong, unilocular, pale yellow, enveloped in a hyaline double membrane; ·039 to ·049 in. long, by ·012 to ·017 in. broad.

Porina pertusa, var. *areolata,* Ach. Syn. 109.—*Pertusaria communis, β. areolata,* Fries L. Ref. 421. Nyl. L. P. 48!—*P. areolata,* Massal. Ric. 189. fig. 390.—*P. rupestris,* Kbr. S. L. G. 382 in pt.

On rocks, walls, etc., in mountainous districts. Near Bristol! *Miss M. Atwood.* Near Ayton! Cleveland.

3. PERTUSARIA LACTESCENS, *Mudd.* Thallus contiguous, thickish, tartareous, smooth, at length rimoso-areolate, greyish or creamy-white; areolæ flat, often appearing as if waterwashed or abraded, at times somewhat sorediiferous. Fertile verrucæ sparingly scattered over the thallus, rather large, flat, contorted and difformed; ostiola brownish-black, flat, subsequently confluent, forming irregular discs which are surrounded by the abraded thallodal margins of the verrucæ; nuclei confluent, gelatinous, pale; asci numerous, clavato-saccate, 2 spored; spores elliptical, unilocular, pale yellowish-green or pale yellow, each enveloped in a hyaline double membrane; ·024 to ·027 in. long, by ·014 to ·017 in. broad.

b. LACTEA, (*Tayl.*) Thallus as above. Verrucæ sterile, transformed into white pulverulent soredia.

Variolaria lactea, Tayl. Fl. Hib. pt. 2. 113.—Sm. E. Bot. 2410?—Hook. Brit. Fl. 2. 170?

On rocks, old walls, &c., in mountainous districts. Ayton Moor! and on the parapets of Airyholme Bridge! Cleveland, Yorkshire. b.—On rocks, Ballygaly Head! Co. Antrim, *Dr. Taylor.* In the form of apothecia this species bears a strong resemblance to *P. fallax.* It is distinguished from it by its place of growth, and number of spores in each ascus.

4. **Pertusaria syncarpa**, *Mudd.* Thallus subdeterminate or effuse, thick, tartareous, greyish-lead colour, covered with simple or branched densely crowded isidioid papillæ, eventually fractured into rugged areolæ; hypothallus white. Fertile verrucæ of a medium size, elevated, congregated into masses or heaps of from 2 to 20 verrucæ, sparingly scattered over the surface of the thallus, at first entirely covered by the white hypothallus, ultimately irregularly lacerato-erumpent; ostiola subdisciform, slightly convex, or plane, pale brown, surrounded by the remains of the lacerated hypothalline margins; nucleus subgelatinous, pale flesh-colour; asci subclavato-saccate, 2 spored; spores linear-oblong or elliptical-oblong, unilocular, pale yellow tinged with brown, each enveloped in a hyaline double membrane; ·024 to ·031 in. long, by ·011 to ·013 in. broad. PLATE 5. *fig.* 113.

Variolaria corallina, *V. polythecia*, and *V. chlorothecia*, Tayl. Fl. Hib. pt. 2. 113. 114.

β. DEALBATA, (*Ach.*) Thallus as above. Verrucæ sterile, transformed into white pulverulent soredia.

Lichen dealbatus, Ach. Prod.—*Isidium paradoxum*, Turn. et Borr. Lich. Brit. 97.—Hook. Brit. Fl. 2. 231.—Leight. Exs. 320!—*Lecanora rimosa*, var. *dealbata*, Schær. Enum. 71.

γ. CORALLINA, (L.) Thallus thick, covered with simple or branched isidioid papillæ, when old fractured into rugged areolæ. Verrucæ none.

Lichen corallinus, L.—Sm. E. Bot. 1541.—*Isidium corallinum*, Ach. Syn. 281.—Hook. Brit. Fl. 2. 231.—*Lecanora rimosa*, var. *corallina*, Schær. Enum. 71, L. H. 236!—*Zeora sordida*, var. *coralloidea*, Kbr. S. L. G. 134.

On rocks and walls in alpine districts. Dunkerron Mountains! *Dr. Taylor.* Ayton Moor! Kildale Moor! Westerdale! and Baysdale! all in Cleveland. The infertile forms are of more frequent occurrence. *Variolaria corallina*, *polythecia*, and *chlorothecia* of Taylor, are only different states of one species, which I have named *syncarpa*, solely to prevent further confusion. *Isidium paradoxum* and *corallinum* of Authors, are apparently nothing more than sterile forms of the same plant. The form of the thallus, structure of the *fertile verrucæ*, and the internal organization of the *spores*, show that this species is quite distinct from *Lecanora glaucoma.*

SECT. 2.—*Corticolæ; or rarely saxicolæ.*

5. **Pertusaria globulifera**, (*Smith.*) Thallus suborbicular, thickish, cartilagineo-membranaceous, subtartareous, plicato-rugose, greenish-grey or glaucous, surrounded at the circumference by a zonate hypothalline margin. Fertile verrucæ large, globular, their

apices slightly depressed and eventually irregularly lacerato-dehiscent, becoming pseudo-scutelliform; nucleus pale flesh-colour, enveloped with white soredia; asci saccate, 1 or rarely 2 spored; spores very large, linear-oblong or elliptical-oblong, unilocular, pale yellow, enveloped in a hyaline double membrane; ·045 to ·065 in. long, by ·012 to ·014 in. broad.

Lichen globuliferus, Sm. E. Bot. 2008.—*Variolaria globulifera*, Hook. Brit. Fl. 2. 169.—Ach. Syn. 130.—*Pertusaria globulifera*, Nyl. Enum. Gen. 116.

β. MULTIPUNCTATA, (*Turn.*) Thallus as above. Fertile verrucæ hemispherical, each containing from 1 to 12 nuclei; ostiola at first covered with a thickish coat of white soredia, subsequently nearly naked; nucleus pale rose or flesh-colour, imbedded in white soredia.

Variolaria multipunctata, Turn. in Linn. Trans. v. 9. p. 137. tab. 10. fig. 1.—Hook. Brit. Fl. 2. 170.—*Lichen multipunctatus*, Sm. E. Bot. 2061.

γ. SOREDIATA, (*Fries.*) Thallus as above. Verrucæ sterile, transformed into white pulverulent soredia.

Pertusaria communis, var. *sorediata*, Fries L. Ref. 422—*Variolaria aspergilla*, Sm. E. Bot. 2401, *Lichen fagineus*, Sm. E. Bot. 1713, *L. discoideus*, Sm. E. Bot. 1714 and *Variolaria griseo-virens*, Sm. 2400.—*V. griseo-virens, discoidea, faginea* and *aspergilla*, Hook. Brit. Fl. 2. 168. 169. 170.—Tayl. Fl. Hib. pt. 2. 112, and *V. constellata*, 113.

δ. COCCODES, (*Ach.*) Thallus suborbicular, tartareous, greyish-white, covered to a greater or less extent with simple or branched isidioid papillæ, eventually fractured into tumid areolæ. Verrucæ infertile, or wanting.

Lichen coccodes, Ach. Prod.—Sm. E. Bot. 1511.—*Isidium coccodes*, Ach. Syn. 283.—Hook. Brit. Fl. 2. 230.

On the trunks of old trees in woods, etc. α. and β.—New Forest! *Admiral Jones*. Near London! *F. Y. Brocas*. Malham! Yorkshire, *Dr. Carrington*. Brantsdale! North Yorkshire. Kildale! Cleveland.

γ. and δ.—Common on the trunks of both old and young trees. To attempt to describe every sorediiferous or sterile form of the different species of this genus, under distinct and separate names, appears to me to be both unwise and unnecessary. Four species of *Variolaria* of Authors, I think are clearly traceable through their various graduations to *P. globulifera*, which is apparently the fertile or normal form, and to the variety *multipunctata*, which is also fertile. FRIES, and a few others, regard *Variolaria faginea*, etc., as sorediiferous states of *P. communis*. If a series of specimens of each are collected, I think, they will be found to pass gradually into *P. globulifera*.

6. PERTUSARIA VELATA, (*Smith.*) Thallus suborbicular, determinate, thin, cartilagineo-membranaceous, verrucoso-areolate in the centre, plicate near the circumference, greenish-white or greyish-green. Fertile verrucæ small, subglobular when young, afterwards flattened, subdisciform, regular, distinct and separate, scattered; ostiolum flat, covered with a white membranous veil, surrounded by a thick slightly elevated thallodal margin; nucleus pale flesh-colour, gelatinous when moist, ceraceous when dry; asci elongato-oblong, one spored; spores very large, elongato-elliptical, unilocular, pale yellowish-rose or yellow, each enveloped in a hyaline double membrane; ·051 to ·061 in. long, by ·014 to ·016 in. broad. PLATE 5. *fig.* 114.

Lichen velatus, Sm. E. Bot. 2062.—*Variolaria velata*, Hook. Brit. Fl. 2. 170.

On the trunks of various trees in mountainous woods, etc. New Forest! *Admiral Jones*. The thin thallus, total absence of sorediiferous excrescences, subdisciform aspect of the fertile verrucæ, and the white membranous veil which covers the nuclei are characters which will always prevent the confusion of this species with the preceding. In its general external appearance it closely resembles *Lecanora pallescens*, *β. tumidula*; indeed it is not at all times distinguishable from it, and unless their apothecia are dissected and their spores examined, they may be passed for each other.

7. PERTUSARIA COMMUNIS, DC. Thallus determinate, membranaceo-cartilaginous, smooth, rimulose, colliculoso-verrucose, glaucous-white or grey, surrounded at the circumference by a pale zonate hypothalline margin. Fertile verrucæ subglobose or variously difformed, smooth, each containing from 1 to 6, or more, nuclei; ostiola brownish-black, punctiform, depressed; nucleus pale flesh-colour; asci saccate, 2 spored; spores elliptical, unilocular, pale yellow, each enveloped in a hyaline double membrane; ·039 to ·045 in. long, by ·017 to ·018 in. broad.

Pertusaria communis, DC.—Fries L. Ref. 420.—Hook. Brit. Fl. 2. 160.—Leight. Brit. Angi. Lich. 27. pl. 9. fig. 3.—Schær. Enum. 229, L. H. 118!—Massal. Ric. 187. fig. 382.—Hepp Eur. 222!—Kbr. S. L. G. 385.—Nyl. Enum. Gen. 116.—*Lichen pertusus*, Sm. E. Bot. 677.

On the trunks of trees; very common.

8. PERTUSARIA MELALEUCA, (*Smith.*) Thallus thin, subdeterminate, membranaceo-cartilaginous, smooth, rimuloso-verrucose, yellowish cream-colour. Fertile verrucæ more or less scattered, of a medium size, hemispherico-depressed, irregular, each containing one or many nuclei; ostiola brownish-black, pseudo-disciform, depressed, surrounded by the remains of the lacerated margins of the verrucæ; nucleus pale, somewhat depressed; asci clavato-saccate, 2 spored; spores elliptical, unilocular, pale yellow, each enveloped in a hyaline double membrane; ·015 to ·019 in. long, by ·007 to ·008 in. broad.

Lichen melaleucus, Sm. E. Bot. 2461.—*Thelotrema melaleucum*, Hook. Brit. Fl. 2. 161.—*Pertusaria melaleuca*, Leight. Brit. Angi. Lich. 29. pl. 10. fig. 3.—*Pertusaria Wulfenii*, Fries L. Ref. 424 in pt.—Massal. Ric. 189. fig. 388?

On the trunks of various trees; not common. This species somewhat resembles states of *P. fallax*. It is distinguished by the number of spores in each ascus.

9. PERTUSARIA PUSTULATA, (*Ach.*) Thallus thin, somewhat effuse, membranaceo-cartilaginous, smooth, contiguous or slightly rimose, grey or greyish-olive. Fertile verrucæ irregularly and rather distantly scattered, variable in size, subglobose, each containing one or more nuclei, entirely covered with the thallus when young, erumpent when mature; ostiola dark-brown, slightly depressed, punctiform; nucleus pale, rounded; asci elongato-cylindrical, 2-4 spored; spores elliptical, unilocular, pale yellow, enveloped in a hyaline double membrane; ·016 to ·021 in. long, by ·007 to ·009 in. broad.

Porina pustulata, Ach. Syn. 110.—*Pertusaria pustulata,* Leight Brit. Angi. Lich. 30. pl. 10. fig. 4. Exs. 230 !—Nyl. Enum. Gen. 116.
On the trunks of young trees, especially oaks and hazels ; common.

10. Pertusaria fallax, (*Pers.*) Thallus subeffuse or determinate, cartilagineo-membranaceous, smooth, plicato-rugose, greyish or yellowish-olive. Fertile verrucæ crowded, variously contorted and difformed, each containing many confluent nuclei; ostiola black, confluent, depressed, forming irregular discs, each surrounded by a thallodal rim; nuclei gelatinous, pale flesh-coloured; asci clavato-ventricose, 8 spored; spores elliptical, unilocular, pale yellow, each enveloped in a hyaline double membrane; ·017 to ·021 in. long, by ·007 to ·011 in. broad.
Verrucaria fallax, Pers.—*Porina fallax,* Ach. Syn. 110.—*Lichen hymenius,* Sm. E. Bot. 1731.—*Pertusaria Wulfenii,* Fries L. Ref. 424 in pt.—Nyl. Enum. Gen. 116. L. P. 49 !—*P. fallax,* Hook. Brit. Fl. 2. 160.—Leight. Brit. Angi. Lich. 29, pl. 10. fig. 2. Exs. 71 !—Massal. Ric. 188. fig. 386.—*P. communis,* var. *fallax,* Schær. Enum. 229.
β. sulphurea, (*Schær.*) Thallus areolato-verrucose, pale greenish-yellow. Fertile verrucæ and asci as above; spores elliptical or elliptical-oblong, their extremities more or less attenuated, pale yellow, each enveloped in a hyaline double membrane; ·021 to ·025 in. long, by ·008 to ·011 in. broad.
Pertusaria sulphurea, β. rupicola, Schær. Enum. 229. L. H. 594 ! 595 !—P. *sulphurea,* Massal. Ric. 187. fig. 383.
γ. variolosa, (*Fries.*) Thallus thickish, effuse, subtartareo-pulverulent, greenish-yellow or sulphur-colour. Verrucæ sterile, dissolved into yellow pulverulent soredia.
Pertusaria Wulfenii, var. *variolosa,* Fries L. Ref. 425.—*Lepraria lutescens,* Ach.—Sm. E. Bot. 1529.—*Isidium lutescens,* Hook. Brit. Fl. 2. 230.—*Pertusaria sulphurea,* var. *corticola,* subvar. *isidioidea,* Schær. Enum. 228, L. H. 238 !
On the trunks of trees, and occasionally on rocks, in subalpine districts. *α.* and *γ.* common on trees in mountainous woods. *β.* on rocks. Dunkerron Mountain ! *Dr. Taylor.* Sybil Head ! *I. Carroll, Esq.* This variety differs from *P. lactescens* by the colour of its thallus and number of spores in each ascus.

11. Pertusaria leioplaca, (*Ach.*) Thallus subdeterminate, membranaceo-cartilaginous, smooth, colliculose, glaucous-white or pale yellowish-brown. Fertile verrucæ large, distinct and scattered or rarely confluent, hemispherical, each usually containing only one nucleus; ostiola brownish-black, punctiform, slightly depressed; nucleus gelatinous, pale flesh-colour; asci elongato-cylindrical, 4-6 spored; spores elliptical, unilocular, greenish or pale yellow, each enveloped in a hyaline double membrane; ·014 to ·021 in. long, by ·005 to ·009 in. broad.
Porina lejoplaca, Ach. L. Univ. 309.—*Pertusaria lejoplaca,* Schær. Enum. 230. L. H. 119 !—Massal. Ric. 188. fig. 385.—Kbr. S. L. G. 386.—Nyl. Enum. Gen. 117.—*P. communis,* Fries L. Ref. 421 in pt.
On the trunks of trees in mountainous districts. Castleton ! Braemar, *Admiral Jones.* Sowerdale ! Hoggarts Wood ! and Airyholme ! Cleveland, Yorkshire. This species may be known from *pustulata* by

its more determinate habit, scattered fertile verrucæ, larger ostiola, and by each verrucæ mostly containing only one nucleus.

SECT 3.—*Muscicolæ or terricolæ.*

12. PERTUSARIA GLOMERATA, *(Schl.)* Thallus effuse, cartilaginous, interruptedly plicato-verrucose, smooth, pale yellowish-olive or cream-colour. Fertile verrucæ globular, agglomerate, smooth, each containing one nucleus; ostiola dark-brown, depressed, or subpapillato-prominent, punctiform; nucleus pale brownish-yellow, rounded; asci cylindrico-saccate, 4 spored; spores elliptical, unilocular, pale yellow, each enveloped in a hyaline double membrane; ·021 to ·025 in. long, by ·007 to ·009 in. broad.

Lichen glomeratus, Schl.—*Parmelia verrucosa*, b. *Pertusaria*, Fries L. Ref. 186.—*Pertusaria*———, Leight. Brit. Angi. Lich. 30. pl. 11. fig. 2.—*Pertusaria glomerata*, Schær. Enum. 230, L. H. 120 !—Massal. Ric. 189. fig. 389.—Kbr. S. L. G. 388.—Nyl. Enum. Gen. 117.

On moss, etc. in alpine districts. Craig-na-Calliach ! Perthshire, *Dr. Maingay.*

13. PERTUSARIA HUTCHINSIÆ, *(Turn. et Borr.)* Thallus subdeterminate or effuse, subtartareo-membranaceous, smooth, plicato-rugose, white or cream-colour. Fertile verrucæ of a medium size, somewhat numerous and crowded, difformed, becoming pseudo-disciform; ostiola large, brownish-black, cæsio-pruinose, depressed; nucleus pale, gelatinous; asci subclavato-saccate, one spored; spores elliptical-oblong, unilocular, pale yellow, each enveloped in a hyaline double membrane; ·042 to ·052 in. long, by ·014 to ·016 in. broad.

Thelotrema Hutchinsiæ, Turn. et Borr. L. Brit. 178.—Borr. E. Bot. Suppl. 2652.—Hook. Brit. Fl. 2. 162.—Tayl. Fl. Hib. pt. 2. 103.—*Pertusaria Hutchinsiæ*, Leight. Brit. Angi. Lich. 30. pl. 11. fig. 1.—Nyl. Enum. Gen. 116.

On the ground, encrusting fragments of heath, moss, etc. Near Bantry ! Ireland. Authentic specimens ! in herb. *Rev. W. A. Leighton*, and *D. Moore, Esq.* Care must be taken not to confound this with *Aspicilia verrucosa*, a species resembling it in its outward appearance. The size and number of spores in each ascus will readily distinguish them.

14. PERTUSARIA MACROSPORA, (*Hepp.*) Thallus somewhat effuse, thin, cartilagineo-membranaceous, smooth, white or cream-colour. Fertile verrucæ of a medium size, numerous, very prominent, substipitate, regular, disciform; ostiolum flat, rather large, pale brown when young, dark-brown when mature, surrounded by a thickish white thallodal margin; nucleus pale, gelatinous; asci cylindrico-saccate, one spored; spores oblongo-obovate or oblong, unilocular, pale yellow, each enveloped in a hyaline double membrane; ·045 to ·055 in. long, by ·014 to ·017 in. broad.

Pertusaria macrospora, Hepp Eur. 424 !—Nyl. Enum. Gen. 116.—*Lecanora subfusca*, var. *pachnea*, Schær. Enum, 76 in pt.—*Lecanora bryontha*, Ach. Syn. 156 in pt.

On the ground, encrusting mosses, etc. in alpine districts. Highlands of Scotland ! in herb. *Mr. R. Brown* (sub *Lecanora oculata*). This is a very fine species. It bears a strong resemblance when fully developed, in its external appearance, to states of *Lecanora subfusca*, var. *epibryon*, and to *L. oculata*. The structure of its apothecia, and form of its asci and spores, must be observed, in order to distinguish them from each other. It may be known from *P. Hutchinsiæ*, by its large very prominent or substipitate fertile verrucæ, and large flat brown ostiola.

Genus 2. Thelotrema, (*Ach.*)

Apothecia solitary, superficial, verrucæform, formed of the same substance as the thallus, at first closed, subsequently open, pseudo-urceolate, each verruca containing a deeply-sunken nucleus, enveloped in a proper membranaceous tunic, ultimately collapsing into a depressed rigid disc, the apex lacero-dehiscent; asci clavato-cylindrical, 4 spored; paraphyses capillary, flexuose; spores subfusiform or fusiform, submuriform-multilocular, pale yellow. Thallus cartilagineo-crustaceous, uniform.

1. Thelotrema lepadinum, *Ach.* Thallus somewhat effuse, membranaceo-cartilaginous, smooth, when old subleprous, greyish-white, olive, or cream-colour. Apothecia truncato-conoid, becoming urceolato-subscutelliform; nucleus collapsed, concavo-discoid, dark-brown, at first cæsio-pruinose, afterwards naked; inner tunic irregularly dehiscing, outer one regular; asci narrow clavato-cylindrical, 4 spored; spores fusiform or oblongo-fusiform, submuriform-multilocular, pale yellow or subhyaline; ·012 to ·018 in. long, by ·003 to ·0045 in. broad. Plate 5. *fig.* 116.

Thelotrema lepadinum, Ach. Meth. 322.—Fries L. Ref. 428.—Hook. Brit. Fl. 2. 161.—Schær. Enum. 225, L. H. 121 !—Leight. Brit. Angi. Lich. 31. pl. 12. fig. 1. Exs. 121 !—Nyl. Enum. Gen. 118. L. P. 50 !—Kbr. S. L. G. 330.—*Volvaria lepadina*, Massal. Ric. 141. fig. 277.—*Lichen inclusus*, Sm. E. Bot. 678.

β. rupestre, *Turn.* et *Borr.* Thallus tartareous, more or less dispersed and separated, cream-colour. Apothecia urceolato-scutelliform, crowded together into masses of various size; otherwise as above.

Thelotrema lepadinum, var. *rupestre*, Turn. et Borr. Lich. Brit. 180. —Leight. Brit. Angi. Lich. 32. pl. 12. fig. 2.

On the trunks of trees in mountainous woods, etc.; frequent. *β.*—On rocks, Teesdale! Durham, *Rev. J. Harriman.*

Genus 3. Petractis, (*Fries.*)

Apothecia solitary, verrucæform, semi-immersed, depresso-globose; nucleus enveloped in a double receptacle; the external one, formed of the same substance as the hypothallus, closed when young, afterwards stellato-fissured; the internal one, subceraceous, yellow, semi-opaque, closed, subsequently lacerato-dehiscent; the nucleus becoming pseudo-disciform; asci elongato-clavate, 8 spored; paraphyses capillary, diffluent; spores broadly-fusiform or obovate, quadrilocular, uncoloured. Thallus crustaceous, uniform; hypothallus white.

1. Petractis exanthematica, (*Sm.*) Thallus effuse, thin, leproso-tartareous, contiguous, smooth and equal, greyish-white; hypothallus

white, generally more or less confused with the thallus Apothecia of a medium size, irregularly scattered, immersed in the thallus and rock beneath, at length partly emersed, depresso-globose; nucleus yellow, enveloped in a double receptacle, the external one creamy-white, closed when young, stellato-fissured when mature, the internal one yellow, subceraceous; asci elongato-clavate, 8 spored; spores broadly-fusiform or obovate, quadrilocular, subhyaline or hyaline; ·005 to ·006 in. long, by ·0015 in. broad. PLATE 5. *fig.* 117.

Lichen exanthematicus, Sm. E. Bot. 1184.—*Thelotrema exanthematicum*, Ach. L. Univ. 313.—Hook. Brit. Fl. 2. 161.—Leight Brit. Angi. Lich. 32. pl. 12. fig. 3.—*Gyalecta exanthematica*, Fries. L. Ref. 197.—*Thelotrema clausum*, Schær. Enum. 225, L. H. 122.—*Gyalecta clausa*, Massal. Ric. 146. fig. 285.—*Patellaria clausa*, Hepp Eur. 206! —*Petractis exanthematica*, Kbr. S. L. G. 329.—*Lecidea exanthematica*, Nyl. Enum. Gen. 119.

On exposed calcareous rocks. Teesdale! Durham, *Rev. J. Harriman.* Ingleborough! *Dr. Carrington.* Durdham Down! near Bristol, *Miss M. Atwood.* A glance at the synonyms of this species will be sufficient to satisfy the most superficial observer of the extent of the different views entertained of it by various Lichenists. As will there be seen, one places it in one genus and another in another and at times in totally opposite tribes. The peculiar structure of its apothecia, alone, to my mind, seems sufficient to warrant its separation from the whole of the genera in which it has hitherto been placed, as there certainly does not exist any real affinity in the structure of their fruits; consequently I have adopted the same plan as KOERBER, viz. placed it in a separate genus. The distinguishing characters of both the genus and species are, the simi-immersed depresso-globose apothecia, double tunic or receptacle, stellato-fissured orifice, and quadrilocular uncoloured spores.

GENUS 4. PHLYCTIS, (*Wallr.*)

Apothecia maculæform-difformed, solitary or aggregated and grouped, at first immersed in thallodal verrucæ, closed, afterwards irregularly dehiscent, and finally pseudo-disciform; ostiolum covered with a thin thallodal pruinose veil; nucleus depressed or subglobose, when moist gelatinous, pale flesh-colour, when dry indurated, greyish-brown; asci oblongo-clavate, 1-2-3 spored; paraphyses very slender, distinct, subconglutinate; spores elliptical-oblong, muriform-multilocular, pale yellowish-brown, with a minute papillæform hyaline appendage attached to each extremity. Thallus crustaceous, becoming leproso-pulverulent.

1. PHLYCTIS AGELÆA, (*Ach.*) Thallus subdeterminate or effuse, thin, contiguous, submembranaceous, smooth, greenish-white, eventually more or less dissolved, white-pulverulent. Apothecia of a medium size, rather inconspicuous, enclosed in slightly elevated difformed pulverulent thallodal verrucæ, solitary and scattered, or aggregated and grouped, at first closed, ultimately irregularly dehiscent; ostiolum small, flattish, dark-brown or nearly black, cæsio-pruinose, surrounded by the elevated tumid portions of the thallodal receptacle; asci oblongo-clavate, 2-3-4 spored; spores elliptical-oblong, often difformed and very irregular through compression in the asci, muriform-multilocular, pale yellowish-brown, each having a minute papillæform hyaline appendage attached

to each extremity; ·012 to ·017 in. long, by ·004 to ·007 in. broad. PLATE 5. *fig.* 118.

Lichen agelæus, Ach. Prod.—Sm. E. Bot. 1730.—*Parmelia impolita, status*, Fries L. Ref. 184.—*Variolaria agelæa*, Hook. Brit. Fl. 2. 171. —*Pertusaria lejoplaca*, var. *scutellaris*, Schær. Enum. 230.—*Phlyctis agelæa*, Massal. Ric. 58. fig. 107.—Kbr. S. L. G. 391.—Nyl. Enum. Gen. 117, L. P. 51!—Leight. Exs. 282!

On the trunks of trees in shady woods, etc. Near London! *Dr. Maingay.* Airyholme Wood! Hoggarts Wood! and in Kildale! all in Cleveland, Yorkshire. This is an excellent species, and one which may be easily recognised. Its thallus forms patches of various sizes on the trunks of trees, especially those of ash, sometimes covering nearly the whole of their trunks, and over-running all other species with which it comes in contact; it is smooth and tolerably even, when young, but when more advanced it becomes cracked, and the cortical stratum or surface suffused with white powder which easily rubs off. Its apothecia are not very readily observed, unless specially looked for; they are at first entirely enclosed in thallodal warts, which have a mealy aspect and resemble soredia or pulverulent excrescenses; when further developed, each wart opens in an irregular manner and discloses a depressed nucleus, the upper or exposed part changing its colour from pale to dark-brown or nearly black, becoming hard and somewhat horny, and finally assuming a disciform aspect.

2. PHLYCTIS ARGENA, (*Ach.*) Thallus thin, effuse, membranaceous, at first smooth and even, afterwards plicato-rugulose, sorediiferous and pulverulent, silvery-grey or cream-colour. Apothecia enclosed in small scattered subelevated slightly pulverulent thallodal verrucæ, at length irregularly or regular dehiscing, becoming pseudo-discoid, pale brown, cæsio-pruinose, surrounded by the inflexed tumid, even or rugged portions of the thallodal receptacle; asci obovato-clavate, one, or rarely two, spored; spores sublinear-oblong, muriform-multilocular, pale yellowish-brown, each having a minute papillæform hyaline appendage attached to each extremity; ·025 to ·032 in. long, by ·007 to ·009 in. broad.

Lichen argenus, Ach. Prod.—Sm. E. Bot. 1923.—*Parmelia subfusca*, et. *impolita, status*, Fries L. Ref. 136. 184.—*Variolaria argena*, Hook. Brit. Fl. 2. 171.—*Phlyctis argena*, Kbr. S. L. G. 371.—Nyl. Enum. Gen. 117.

On the trunks of old trees; common in a sterile state, rare in a fertile one. Authentic specimens! ex herb. *Rev. W. A. Leighton.* On old hawthorns in Kildale! Cleveland. This species is easily distinguished from the preceding one, by the size and number of spores in each ascus. The sterile form or thallus only is of very frequent occurrence, and has apparently often been passed over as *Lepraria alba* of authors.

TRIBE 4. VERRUCARIEÆ, (*Fries.*)

Thallus crustaceous, uniform. Apothecia verrucæform, distinct from the thallus, solitary, innato-sessile, hemispherical or globose; proper receptacle (*perithecium*), for the most part corneo-carbonaceous, black; the apex (*ostiolum*) usually slightly depressed and when mature perforated by a regular pore; nucleus globose, subhyaline, more or less gelatinoso-diffluent.

GENUS 1. SPHÆROMPHALE, (*Rchb.*)

Apothecia solitary conico-hemispherical or globose, immersed or semi-immersed; perithecium entire or dimidiate, for the most part corneo-carbonaceous, black; ostiolum normally perforated by a simple pore; nucleus gelatinous when moist, hyaline or pale yellowish-brown; asci saccato-clavate or oblongo-ventricose, 2-4-8 spored; paraphyses for the most part indistinct; spores elliptical-oblong or ovate, muriform-multilocular, coloured. Thallus crustaceous, uniform.

1. SPHÆROMPHALE UMBRINA, (*Whlnb.*) Thallus effuse, thinnish, when moist subgelatinous and contiguous, when dry tartareous and somewhat rimulose, smooth, varying in colour from pale-brown to dark-brown, or nearly black. Apothecia rather large, sparingly and irregularly scattered, at first entirely covered by the thallus, afterwards partly emersed, subprominent, hemispherical, dark-brown or nearly black; perithecium dimidiate, the apex perforated by a small simple pore; nucleus pale yellow; asci saccato-clavate, 2 spored; spores linear-oblong or oblongo-obovate, muriform-multilocular, dark bright-brown; ·008 to ·011 in. long, by ·0035 to ·004 in. broad.

Verrucaria umbrina, Whlnb. Fl. Suec. 871.—Fries L. Ref. 441.—Nyl. Syn. Pyren. 21 in pt.—*V. fissa*, Tayl. Fl. Hib. 2. 95.—*Endocarpon lithinum*, and *E. fissum*, Leight. Brit. Angi. Lich. 19. 20. pl. 6. fig. 1. 2. 3. Exs. 98!—*Thelotrema fissum*, Hepp Eur. 103!—*Sphæromphale fissa*, et *elegans*, Kbr. S. L. G. 335.

On rocks and stones in the beds of alpine and subalpine streams. Rocky bed of the river Dee! at Llangollen! Denbighshire, *Rev. W. A. Leighton.* High-force! Teesdale, Durham, *Rev. J. Harriman.* Near Ardglass! Co. Down, Ireland, *Dr. Maingay.* Near Cork! *I. Carroll, Esq.* Ben Lawers! *Admiral Jones.* This species may be distinguished at once from all the following, by the number of spores in each ascus.

2. SPHÆROMPHALE TEREBRATA, *Mudd.* Thallus very thin, subdeterminate, tartareous, contiguous, of a dirty-white or smoky-brown colour; often evanescent, or so thin as to be scarcely perceptible. Apothecia small, irregularly scattered, deeply immersed in the rock, their apices flattened or slightly convex; perithecium entire, black, carbonaceous; ostiolum somewhat depressed, at length perforated by a very minute pore; inner tunic dark-brown; nucleus pale yellow, diffluent; asci broadly-clavate, 4 to 8 spored; spores oblong or ovate, muriform-multilocular, or filled with a coarsely grumous protoplasm, yellowish-brown or dark-brown; ·008 to ·012 in. long, by ·004 to ·005 in. broad.

Verrucaria umbrina, var. *calcarea*, Nyl. Syn. Pyren. 21 in pt.

On calcareous rocks in mountainous districts. Near Castleton! Braemar, *Admiral Jones.* Penhill! Yorkshire, *I. G. Baker, Esq.* This differs from the preceding species by its deeply immersed apothecia, entire perithecium, and number of spores in each ascus. In its external appearance it resembles *Verrucaria calciseda*, and *Thelidium immersum.*

3. Sphæromphale hymenogonia, (*Nyl.*) Thallus effuse, thin, leproso-tartareous, greyish-white or pale brown; often evanescent. Apothecia small, irregularly scattered, semi-immersed, subglobose, black; perithecium entire, the apex slightly depressed and at length perforated by a simple pore; nucleus pale, gelatinous; asci oblongo-ventricose, 8 spored; spores oblong or linear-oblong, muriform-multilocular, pale yellowish-brown; ·005 to ·007 in. long, by ·002 to ·0035 in. broad.

Verrucaria hymenogonia, Nyl. Prod. 184. Syn. Pyren. 32.—*V. muralis*, Borr. E. Bot. Suppl. 2647. fig. 2.—Hook. Brit. Fl. 2. 154.—Leight. Brit. Angi. Lich. 46. pl. 20. fig. 1.

On the mortar of old walls and at times on calcareous rocks. Near Cork! Ireland, *I. Carroll, Esq.* Limestone-ridge at the N. W. slope of Morane, Castleton! *Admiral Jones.* This species resembles *Verrucaria rupestris*, var. *muralis*, in its habit and general appearance. The internal organization of their spores separates them.

4. Sphæromphale scotinospora, (*Nyl.*) Thallus either altogether absent, or effuse, thin, tartareous, rimoso-areolate, at first smooth, afterwards slightly pulverulent, creamy-white or yellowish-brown. Apothecia rather large, irregularly scattered, innato-sessile, hemispherico-conoid, black; perithecium dimidiate; inner tunic entire, black; ostiolum slightly depressed, perforated by a simple pore; nucleus pale, gelatinous,; asci subclavato-ventricose, 8 spored; spores oblong, or elliptical-oblong, irregularly submuriform-multilocular, variable in colour, dark-green, yellowish-brown, or nearly black; ·007 to ·008 in. long, by ·004 to ·0045 in. broad.

Verrucaria scotinospora, Nyl.

On rocks in alpine districts. Summit of Craig-na-Calliach! *Dr. Maingay.* Ben Lawers! and Head of Lough-na-cat! *Admiral Jones.* This is a very fine species, and one which may be easily recognised, by the size and number of spores in each ascus. Its thallus is sometimes altogether absent, the apothecia then appear very prominent.

5. Sphæromphale verrucoso-areolata, (*Schær.*) Thallus effuse, thickish, tartareous, verrucoso-areolate; areolæ more or less convex, difformed and irregular, creamy-white, at times tinged with rose. Apothecia large, irregularly scattered, semi-immersed in the areolæ, hemispherical; perithecium dimidiate, black, carbonaceous; ostiolum very slightly depressed, at length perforated by a simple pore; inner tunic thin, dark-brown; nucleus pale, gelatinous; asci very large, clavato-subventricose, 8 spored; spores large, oblong or ovate, muriform-multilocular, or filled with a coarsely grumous protoplasm, varying in colour from yellowish-brown to nearly black; ·015 to ·017 in. long, by ·008 to ·009 in. broad. Plate 5. *fig.* 119.

Lecanora atra, var. *verrucoso-areolata*, Schær. Enum. 73. L. H. 538!—*Sporodictyon Schærerianum*, Massal. Ric. 182.—*Verrucaria verrucoso-areolata*, Nyl. Syn. Pyren. 34.

On rocks in alpine districts. Ben Lawers! *Admiral Jones.* This is distinguished essentially from the preceding, by its very large spores.

6. Sphæromphale nigrata, (*Nyl.*) Thallus effuse, thin, subsquamulose or granuloso-crustaceous, rugulose, brownish-black. Apo-

thecia small, subinnate, prominent, globose, black; perithecium entire, the apex very minutely depressed and eventually perforated by a simple pore; nucleus pale yellowish-brown, mucilaginous; paraphyses indistinct; asci oblongo-ventricose, 8 spored; spores elliptical-oblong or subpyriform, irregularly muriform-multilocular or filled with a grumous protoplasm, yellowish-brown; ·008 to ·011 in. long, by ·0035 to ·005 in. broad.

Verrucaria nigrata, Nyl. Enum. Gen. 137.

On the ground in alpine districts. Ben Lawers! *Admiral Jones*. This is a well characterised species. Its place of growth, black thallus, and prominent apothecia, are the chief distinctive features. We are indebted to the researches of the gentleman just named, for the addition of the present species, and the preceding one, to the list of British Lichens.

7. SPHÆROMPHALE CARROLLII, *Mudd*. Thallus thin, determinate, membranaceo-cartilaginous, smooth, contiguous, or slightly rimulose, greyish-white or cream-coloured. Apothecia minute, innate in elevated thallodal verrucæ, solitary, hemispherico-subdepressed; perithecium brownish-black, dimidiate; ostiolum somewhat rugulose, rounded or slightly depressed; pore obsolete; nucleus pale, subgelatinous, enveloped in a pale tunic; paraphyses distinct, capillary, flexuose; asci subcylindrical or elongato-clavate, 6-8 spored; spores elliptical-oblong, or obovate, irregularly muriform-multilocular, pale yellow; very variable in size; ·0035 to ·007 in. long, by ·0015 to ·003 in. broad. PLATE 5. *fig*. 115.

On the smooth bark of young ash trees. Rostellan! Ireland, *I. Carroll, Esq*. For the addition of this very distinct species to the British flora, we are indebted to the gentleman whose name it bears. I know of no British species with which it is in danger of being confounded. (It somewhat resembles *Pyrenula Naegelii*, Hepp. But the asci of that species are only 4 spored; it should be looked for on the trunks of spruce-firs.) The thallus forms small nearly round patches, surrounded at the circumference by a narrow brown or brownish-black hypothalline line; it is thin, membranaceous, smooth and apparently contiguous when young, cracked and somewhat scaly when old, of a greyish-white or creamy-yellow colour. The apothecia are irregularly and rather sparingly scattered, immersed, except their apices, in minute elevated thallodal verrucæ, somewhat resembling the *young* apothecia of *Thelotrema lepadinum*; the perithecium is dimidiate, brownish-black, the apex rather rough and eventually slightly depressed, not collapsed like that of *Thelotrema*; the nucleus is pale, subgelatinous when moist, firm and rather darker-coloured when dry, globose, enveloped in a pale yellowish tunic.

GENUS 2. SEGESTRELLA, *(Fries.)*

Apothecia solitary, hemispherical, more or less immersed in the thallus; perithecium dimidiate, ceraceo-membranaceous, coloured, the apex obscurely perforated by a simple pore; nucleus subgelatinous, hyaline, enveloped in a distinct pale tunic; paraphyses distinct, capillary, flexuose; asci subclavate, 8 spored; spores fusiform, quadrilocular, uncoloured. Thallus crustaceous, uniform.

The principal characters by which this genus is distinguished from the preceding and following ones, are the coloured ceraceo-membranaceous perithecia; distinct paraphyses, and fusiform quadrilocular spores.

1. SEGESTRELLA LECTISSIMA, *Fries*. Thallus thinnish, effuse, when wet mucoso-gelatinous, greyish-green, when dry subtartareous, contiguous or very minutely rimulose, olive-brown. Apothecia minute, hemispherical, immersed in elevated thallodal verrucæ, their apices at length emersed, prominent; perithecium dimidiate, bright-red when young, rusty-brown when old or fully developed, the apex papillose, subsequently perforated by a simple pore, which is visible only in a moist state; asci subclavate, 8 spored; spores fusiform, quadrilocular, hyaline; ·005 in. long, by ·00075 in. broad. PLATE 5. *fig*. 120.

Segestrella lectissima, Fries L. Ref. 430.—*Verrucaria irrigua*, et. *V. erysiboda*, Tayl. Fl. Hib. pt. 2. 94. 98.—*V. irrigua*, Leight. Brit. Angi. Lich. 56. pl. 24. figs. 4. 6. Exs. 32!—*Segestria umbonata*, Schær. Enum. 207. L. H. 285!—*S. thelostoma*, Massal. Ric. 158. fig. 307.—*Segestrella umbonata*, Kbr. S. L. G. 331.—*Verrucaria lectissima*, Nyl. Syn. Pyren. 37.

On rocks and stones, which are occasionally suffused or inundated with water. Co. Kerry! *Dr. Taylor*. Ffridd-du! near Aber, Caernarvonshire, *Rev. W. A. Leighton*. Shetland! *Admiral Jones*.

GENUS 3. VERRUCARIA, *Wigg*.

Apothecia solitary, hemispherical or globose, immersed, subimmersed, or sessile; perithecium entire, or dimidiate, for the most part corneo-carbonaceous, black; ostiolum papillæform, prominent or depressed, at length perforated by a simple pore; nucleus gelatinous, fluid or deliquescing, subhyaline; paraphyses very rarely distinct; asci oblongo-clavate, or obovato-clavate, 8 spored; spores elliptical, elliptical-oblong, or oblong, unilocular, pale yellow, or uncoloured. Thallus crustaceous, uniform.

The genus *Verrucaria*, as here defined, is distinguished, principally, by the form and colour of the spores.

SECT 1.—SAXICOLÆ.

A.—*Perithecium corneo-carbonaceous, black; paraphyses indistinct.*

* *Thallus tartareo-membranaceous, more or less gelatinous when moist.*

1. VERRUCARIA MAURA, *Wahlb*. Thallus very variable in thickness, either thin, membranaceo-subgelatinous, contiguous, smooth and somewhat polished, dark olive-green, or thick, subcrustaceous, rimuloso-areolate, smooth, dull black. Apothecia of a medium size, numerous, irregularly scattered, innate, and covered by the thallus, or prominent and covered only by a very thin membrane, hemispherical, black; perithecium dimidiate; ostiolum more or less depressed, at length perforated by a rather large simple pore; nucleus pale, enveloped in a thin black tunic; asci subclavate, 8 spored; spores oblong, unilocular, hyaline or subhyaline; ·0025 to ·003 in. long, by ·001 to ·00125 in. broad.

Verrucaria maura, Wahlb. in Ach. Meth. Suppl. 19.—Fries L. Ref. 442.—Hook. Brit. Fl. 2. 154.—Leight. Brit. Angi. Lich. 59. pl. 25. fig. 3. Exs. 33!—Kbr. S. L. G. 340.—Nyl. Syn. Pyren. 28.—*Lichen maurus*, Sm. E. Bot. 2456.—*Pyrenula maura*, Schær. Enum. 209.

On rocks exposed to the action of the tide on the sea coast. Conway Bay! Caernarvonshire, *Rev. W. A. Leighton.* Dunbar! Scotland, and near Ardglass! Co. Down, Ireland, *Dr. Maingay.* Black Hall Rocks! near Hartlepool, Durham.

2. VERRUCARIA AQUATILIS, *Mudd.* Thallus thin, macular, expanding gradually from a centre, membranaceo-subgelatinous, contiguous, smooth, dull olive-black. Apothecia minute, very numerous, often crowded, semi-immersed, their apices mostly covered by the dull black cortical stratum of the thallus, hemispherical, black; perithecium dimidiate; ostiolum very minutely depressed, at length perforated by a simple pore; nucleus hyaline, enveloped in a thin black tunic; asci very numerous, small, nearly round, 8 spored; spores small, broadly-elliptical, or nearly round, unilocular, hyaline; ·0015 to ·002 in. long, by ·001 in. broad. PLATE 5. *fig.* 121.

On rocks and stones in the beds of mountainous streams and rivulets. Bolton! *Dr. Carrington.* In the East Lyn! North Devonshire, *Miss M. Atwood.* Streams near Ayton! Cleveland, Yorkshire. The habit, thin subgelatinous contiguous black thallus, broad and nearly round asci, and minute broadly-elliptical spores, are the characters by which this species is distinguished.

3. VERRUCARIA HYDRELA, *Ach.* Thallus determinate, somewhat thick, from mucoso-gelatinous becoming subtartareous, smooth, contiguous when wet, subrimulose when dry, dark-olive or olive-brown. Apothecia of a medium size, globose, enclosed in elevated conical thallodal verrucæ, their apices at length slightly protruded; perithecium entire, black; ostiolum very slightly depressed, subsequently perforated by a simple pore; asci oblongo-clavate, 8 spored; spores elliptical-oblong, unilocular, filled with a finely granular protoplasm, subhyaline; ·003 to ·005 in. long, by ·002 in. broad.

Verrucaria hydrela, Ach. Syn. 94.—Hepp Eur. 435!—Massal. Ric. 174. fig. 351.—Kbr. S. L. G. 344.—*V. margacea*, Fries L. Ref. 440 in pt.—Nyl. Syn. Pyren. 26 in pt.—*Pyrenula hydrela,* Schær. Enum. 209, L. H. 521!

On rocks which are liable to be suffused with water. Rocks at the Water Winch near Tenby! Pembrokeshire, *Miss M. Atwood.* Ben Nevis! *Admiral Jones.* Distinguished from *V. aquatilis,* by the colour of the thallus, and larger asci and spores; from *V. lævata,* and *V. chlorotica,* by the apothecia being at first entirely enclosed in elevated thallodal verrucæ.

4. VERRUCARIA CHLOROTICA, (*Ach.*) Thallus determinate, rather thin, suborbicular, mucoso-gelatinous, smooth, contiguous when moist, subrimulose when dry, light-green when moist and growing, greyish-brown when dry. Apothecia minute, at first entirely immersed in the thallus, afterwards emersed so as to be above the level of its surface, convex, black; perithecium entire; ostiolum slightly depressed, eventually perforated by a simple pore; asci subclavate, 8 spored; spores oblong, unilocular, filled with a finely granular protoplasm, pale yellow or hyaline; ·0045 to ·005 in. long, by ·0015 to ·002 in. broad.

Verrucaria chlorotica, Ach. Syn. 94 in pt.—Schær. Enum. 213 in pt.—Leight. Exs. 34!—Hepp Eur. 94!—*Pyrenula elæina,* Schær. Enum.

208, L. H. 590 !—*Verrucaria elæina,* Massal. Ric. 174. fig. 352.—Kbr. S. L. G. 345.—Tayl. Fl. Hib. pt. 2. 91.

On rocks and stones in the beds of rivulets and streams. Pen Trwyn ! Great Orme's Head, Caernarvonshire, *Rev. W. A. Leighton.* Blackwater Bridge ! Co. Kerry, *Dr. Taylor.* Connor Cliff ! *I. Carroll, Esq.* Near Ayton ! Cleveland. The light green thallus, and minute immersed apothecia, will identify this species and prevent its confusion with any of the preceding. An authentic specimen, from Blackwater Bridge, named *V. elæina,* by *Taylor,* is identical with *V. chlorotica.* I do not know to what species the figures in *Leighton's Brit. Angi. Lich. pl.* 27. *fig.* 2. belong.

5. VERRUCARIA SUBMERSA, *Borr.* Thallus effuse, thin, tartareo-membranaceous, smooth, contiguous and somewhat gelatinous when moist, pale greyish-green, minutely rimulose when dry, especially in the region of the apothecia, pale brown. Apothecia of a medium size, numerous, scattered, immersed, at length partly emersed, the thallus a little swollen around their base, depresso-hemispherical, black ; perithecium dimidiate ; ostiolum depressed, eventually perforated ; nucleus pale, gelatinous, enveloped in a pale brown tunic ; asci subclavate, 8 spored ; spores elliptical-oblong, unilocular, filled with a finely granular or grumous protoplasm, pale yellow, or hyaline ; ·0035 to ·005 in. long, by ·0015 to ·0025 in. broad.

Verrucaria submersa, Borr. E. Bot. Suppl. 2768 (non *V. margacea,* Leight. Brit. Angi. Lich. p. 62.).—Hepp Eur. 93 !—*V. chlorotica,* Ach. Syn. 94 in pt.

On rocks and stones which are liable to be inundated or suffused with water. Near Ardglass ! Co. Down, *Dr. Maingay.* Blackwater Bridge ! Co. Kerry, *I. Carroll, Esq.* Kildale ! Cleveland. This species is separated from the preceding one, by its apothecia being more scattered, larger and more prominent, by its perithecium being dimidiate, and its ostiolum more depressed. In other respects they are similar. I cannot see how *Leighton* reconciles the figure of the spores of *V. submersa,* in E. Bot. Suppl. 2768, with those of his *V. margacea.* In E. Bot. they are represented as elliptical, unilocular, subhyaline ; in his Brit. Angi. Lich., as linear, quadrilocular, coloured. I suppose his figures are applicable to *Thelidium cataractarum,* (Hepp.)

6. VERRUCARIA LÆVATA, *Ach.* Thallus rather thick, subdeterminate, suborbicular, tartareo-membranaceous, smooth, contiguous when young, afterwards rimuloso-areolate, pale brown, or greyish-brown. Apothecia of a medium size, innate, at first entirely covered by the thallus, subsequently partly emersed, slightly convex, black ; perithecium entire ; ostiolum minutely depressed, at length perforated by a simple pore ; asci subclavate, 8 spored ; spores elliptical or elliptical-oblong, unilocular, filled with a grumous protoplasm, pale yellowish-rose, or subhyaline ; ·004 to ·0045 in. long, by ·0015 to ·002 in. broad.

Verrucaria lævata, Ach. L. Univ. 284.—Sm. E. Bot. Suppl. 2623. fig. 2.—Hook. Brit. Fl. 2. 153.—Leight. Brit. Angi. Lich. 44. pl. 19. fig. 1. 2. Exs. 198 !

On rocks and stones in alpine and subalpine streams and rivulets. Brook, between Tugford and Abdon ! Shropshire, *Rev. W. A. Leighton.*

Near Cork! *I. Carroll, Esq.* On stones in the bed of the river, in Castle Eden Dean! Durham. Airyholme Wood! Cleveland.

7. VERRUCARIA LEIGHTONII, *Hepp.* Thallus thin, effuse, membranaceous, at first contiguous, afterwards rimulose, smooth, tawny-brown or dark brown. Apotheica rather large, subinnate, prominent, hemispherical, black; perithecium dimidiate; ostiolum depressed, perforated by a rather large pore; nucleus pale, enveloped in a thin black tunic; asci obovato-clavate, 8 spored; spores elliptical-oblong, unilocular, more or less filled with a finely granular protoplasm, pale yellow, or hyaline; ·0045 to ·0055 in. long, by ·002 to ·0025 in. broad.

Verrucaria Leightonii, Hepp Eur. 95!—*Pyrenula æthiobola*, Ach. Syn. 125 in pt.—*P. Funkii*, Spreng. in pt.—*Verrucaria umbrina*, Fries L. Ref. 441 in pt.—*V. Unionis*, Schær. Enum. 216 in pt.—*V. hymenia*, β. *Funkii*, Kbr. S. L. G. 344.

On rocks and stones about the margins of streams and rivulets. Moist rocks, Habishow! near Edinburgh, *Dr. Maingay.* On stones in rivers near Cork! *I. Carroll, Esq.*

β. UMBRINA, (*Leight.*) Thallus thin, uniform, rimuloso-areolate, dark-umber or nearly black. Apothecia small, innate, at length partly emersed, hemispherico-conoid, somewhat polished, black; perithecium dimidiate; ostiolum not depressed, at length perforated by a simple pore; nucleus pale, enveloped in a thin black tunic; asci 8 spored; spores oblong, unilocular, hyaline; ·004 in. long, by ·00125 to ·0015 in. broad.

Verrucaria umbrina, Leight. Brit. Angi. Lich. 52. pl. 23. fig. 2. Exs. 101!—*V. umbrina*, Tayl. Fl. Hib. pt. 2. 93 in pt.—*V. nigrescens*, Hook. Brit. Fl. 2. 155 in pt.

On moist rocks. Diganwy! near Conway, Caernarvonshire, *Rev. W. A. Leighton.* Penzance! *Rev. T. Salwey.* These forms are distinguished from *V. lævata*, which occurs in similar localities, by their thalli being darker in colour, their apothecia larger in size, and their perithecia being dimidiate and perforated by larger pores; from *V. aquatilis*, by their asci and spores being larger in size and different in form; from *V. nigrescens*, by their general habit and appearance.

8. VERRUCARIA PAPILLOSA, *Ach.* Thallus effuse, thin, subtartareous, contiguous, or subrimulose, upper surface rugulose, pale greyish-brown, more or less tinged with green when wet. Apothecia of a medium size, more or less numerous, scattered or crowded, semi-immersed, or nearly sessile, the thallus somewhat swollen around their base, or sessile and entirely denuded, hemispherical, black; perithecium dimidiate; ostiolum slightly depressed, eventually perforated; nucleus pale, enveloped in a brown tunic; asci subclavate, 8 spored; spores oblong or obovate, unilocular, more or less filled with a grumous protoplasm, subhyaline or pale-yellow; ·005 in. long, by ·0015 to ·002 in. broad.

Verrucaria papillosa, Ach. L. Univ. 286.—Leight. Brit. Angi. Lich. 54. pl. 24. fig. 1.—Kbr. S. L. G. 350.

On rocks and stones in moist situations, loose stones in seed fields, etc. Near Cork! *I. Carroll, Esq.* Sowerdale! and in fields near Ayton! Cleveland.

* * *Thallus tartareous, rimoso-areolate.*

9. VERRUCARIA POLYSTICTA, *Borr.* Thallus thin, determinate, tartareous, rimuloso-areolate; areolæ minute, smooth, angular, creamy-white or yellowish-green; hypothallus thick, contiguous, black. Apothecia minute, one immersed in each areola, and penetrating more or less into the hypothallus, at length somewhat emersed so as to be a little above the level of the surface of the areolæ, rounded, black; perithecium entire; ostiolum very slightly depressed; pore invisible to the naked eye; asci clavate, 8 spored; spores oblong, unilocular, hyaline; ·00275 to ·003 in. long, by ·001 in. broad.

Verrucaria polysticta, Borr. E. Bot. Suppl. 2741.—Leight. Brit. Angi. Lich. 49. pl. 21. fig. 5.—*Endocarpon polystictum,* Hook. Brit. Fl. (addenda) 2.

On old walls, etc. Sussex! *Mr. Borrer,* in herb. *Rev. W. A. Leighton.* Ireland! *D. Moore, Esq.* The pale smooth areolate thallus, and thick black hypothallus, if duly observed, will identify this species at sight, and prevent its confusion with any other, inhabiting similar localities.

10. VERRUCARIA PLUMBEA, *Ach.* Thallus thickish, determinate, tartareous, smooth, contiguous or subrimuloso-areolate, bluish-grey or lead-colour; hypothallus black. Apothecia of a medium size, semi-immersed, globose, black; perithecium entire; ostiolum minutely depressed, at length perforated; asci obovato-clavate, 8 spored; spores elliptical-oblong, unilocular, hyaline; ·0025 to ·003 in. long, by ·001 in. broad.

Verrucaria plumbea, Ach. L. Univ. 285.—Fries L. Ref. 438.—Hook. Brit. Fl. 2. 153.—Leight. Brit. Angi. Lich. 45. pl. 19. fig. 5.—Kbr. S. L. G. 348.—Nyl. Syn. Pyren. 24.—*Lichen plumbosus,* Sm. E. Bot. 2540.—*V. cærulea,* Schær. Enum. 216, L. H. 102!—Massal. Ric. 176. fig. 355.—Hepp Eur. 223!

β. CINERACEA, *Mudd.* Thallus determinate, rimoso-areolate, smooth, greyish-brown; hypothallus brown, often indistinct. Apothecia and spores as above.

On calcareous rocks in mountainous districts. Ingleborough! *Dr. Carrington.* Teesdale, Durham, *Rev. J. Harriman.* Penhill! Yorkshire, *I. G. Baker, Esq.* Kenmare! *I. Carroll, Esq.* Near Rievaulx! Yorkshire, and in Newton Wood! Cleveland.

11. VERRUCARIA FUSCELLA, (*Turn.*) Thallus thick, subdeterminate, tartareous, diffracto-areolate, smooth, naked or somewhat pruinose, pale greyish-brown or dark-grey; hypothallus black. Apothecia minute, numerous, innate in the areolæ, subhemispherical or nearly plane; perithecium dimidiate, dark-brown; ostiolum very minute, the pore indistinct; nucleus pale, imbedded in the thallus; asci clavate, 8 spored; spores narrow-oblong or obovate, unilocular, subhyaline; ·003 to ·0035 in. long, by ·001 to ·00125 in. broad.

Lichen fuscellus, Turn. in L. Trans. 7. 90. tab. 8. f. 2.—Sm. E. Bot. 1500.—*Verrucaria fuscella,* Ach. L. Univ. 289.—Schær. Enum. 215.—Massal. Ric. 176.—Kbr. S. L. G. 342.—Hepp Eur. 426!—*Sagedia fuscella,* Fries L. Ref. 413.—Leight. Brit. Angi. Lich. 22. pl. 7. fig. 2.—*Endocarpon fuscellum,* Hook. Brit. Fl. 2. 159.—Tayl. Fl. Hib. pt. 2. 101.—*V. nigrescens,* var. *fuscella,* Nyl. Syn. Pyren. 23.

β. GLAUCINA, (*Ach.*) Thallus thick, rimoso-areolate, glaucous-grey or brown; hypothallus brown; otherwise as above.

Verrucaria glaucina, Ach. Syn. 335.—Hepp Eur. 90!—*V. fuscella*, β. *glaucina*, Schær. Enum. 215.—Massal. Ric. 176.—Kbr. S. L. G. 342.

On the mortar of old walls, calcareous rocks, etc. in alpine districts. Teesdale! Durham, *Rev. J. Harriman*. Ireland! *Miss Hutchins*. Sheep Walk! Armagh! *Admiral Jones*. Old walls on the south-side of the river Wear opposite Stanhope! Durham. The diffracto-areolate thallus, and minute immersed apothecia, will prevent this species from being mistaken for the preceding one. NYLANDER apparently regards *fuscella* as a state of *nigrescens*, but I see no good reason for doing so. The structure and the size of their apothecia are very dissimilar.

12. VERRUCARIA NIGRESCENS, *Pers.* Thallus thickish, subdeterminate, tartareous, rimuloso-areolate, rugulose, dark-brown or nearly black. Apothecia of a medium size, more or less numerous, immersed, at length partly emersed, hemispherical, naked or covered by the epithallus, dull black; perithecium dimidiate, spreading at the base; ostiolum subpapillate, eventually perforated by a minute pore; nucleus pale, enveloped in a dark-brown or brownish-black tunic; asci subclavate, 8 spored; spores elliptical-oblong, unilocular, often filled with a finely granular protoplasm, subhyaline or hyaline; ·005 to ·0055 in. long, by ·002 to ·00275 in. broad.

Verrucaria nigrescens, Pers.—Fries L. Ref. 438.—Leight. Brit. Angi. Lich. 62. pl. 27. fig. 1.—Massal. Ric. 177. fig. 359.—Hepp Eur. 434!—Nyl. Syn. Pyren. 23.—*Pyrenula nigrescens*, Schær. Enum. 210, L. H. 439!—*Verrucaria fuscoatra*, Kbr. S. L. G. 341.

On rocks, old walls, etc.; very common in limestone districts.

β. MACROSTOMA, (*Duf.*) Thallus thick, tartareous, diffracto-areolate; areolæ rather large, rugose, tawny-brown. Apothecia of a medium size, one or more immersed in each areola, at length partly emersed, rounded, black; perithecium entire; ostiolum slightly depressed, subsequently perforated by a simple pore; asci subclavate, 8 spored; spores elliptical, unilocular, at times filled with a finely granular protoplasm, pale yellow or hyaline; ·005 to ·0055 in. long, by ·00225 to ·00275 in. broad.

Verrucaria macrostoma, Duf.—Fries L. Ref. 439.—Schær. Enum. 214.—Leight. Brit. Angi. Lich. 48. pl. 21. fig. 4.—Massal. Ric. 178. fig. 360.—Kbr. S. L. G. 343.—*V. nigrescens*, var. *macrostoma*, Nyl. Syn. Pyren. 24. L. P. 94!

On rocks, and on the mortar of old walls, etc. Near Guisbro'! Cleveland. This, I think, is nothing more than a state of *V. nigrescens*. Its principal distinguishing characters are, its more rugged thallus, uniform texture, and tawny-brown colour, and its entire perithecia.

13. VERRUCARIA VIRIDULA, (*Schrad.*) Thallus thickish, effuse or subdeterminate, tartareous, rimuloso-areolate, rugose, pale brown or greenish olive-brown. Apothecia large, imbedded in the thallus, and often penetrating into the substance below on which they occur, subsequently partially emersed, conical, dark brownish-black; perithecium dimidiate; ostiolum papillæform, eventually perforated; nucleus pale, enveloped in a black tunic; asci subclavate, 8 spored; spores broadly

elliptical, unilocular, filled with a grumous protoplasm, yellowish-rose or yellow; ·006 to ·0065 in. long, by ·003 to ·0035 in. broad.

Endocarpon viridulum, Schrad.—*Verrucaria viridula*, Ach. L. Univ. 675.—Borr. in E. Bot. Suppl. after 2623. fig. 2.—Hook. Brit. Fl. 2. 153.—Schær. Enum. 215.—Massal. Ric. 171. fig. 343.—Hepp Eur. 91! Kbr. S. L. G. 343.—*Sagedia viridula*, Fries L. Ref. 414.—Leight. Brit. Angi. Lich. 23. pl. 7. fig. 3. Exs. 229!—*V. nigrescens*, var. *viridula*, Nyl. Syn. Pyren. 23.

On the mortar of old walls, and on rocks and stones; frequent. This species may be easily recognised by its large spores, which are usually filled with a yellow or yellowish-rose coloured protoplasm. The upper half of the perithecium is twice the thickness of the lower one, and unless this character is duly observed, it might be regarded as entire; inasmuch as the tunic which envelopes the nucleus is simply a continuation of the inner half of the perithecium.

14. VERRUCARIA OCHROSTOMA, (*Borr.*) Thallus rather thick, tartareous, verrucoso-rugose, rimuloso-areolate, varying in colour from a dusky cream or grey, through an olive, to a brownish-black or umber. Apothecia minute, at first entirely immersed in the thallus, ultimately partly emersed, hemispherico-conoid, black; perithecium thin, entire; ostiolum very minute, eventually perforated; asci clavate, 8 spored; spores oblong or elliptical, unilocular, pale yellow or subhyaline; ·004 in. long, by ·00175 to ·002 in. broad.

Sagedia ochrostoma, Borr.—Leight. Brit. Angi. Lich. 23. pl. 7. fig. 4.

On the mortar of old walls. Sussex! *Mr. Borrer.* The present species bears a strong resemblance to states of *viridula*, in its general appearance and habit; it is distinguished by its smaller apothecia, thin and entire perithecium, the upper half of which is not thickened as in *viridula*, also by its spores, which are smaller in size and paler in colour.

* 15. VERRUCARIA MACROCARPA, (*Tayl.*) "Substratum of the thallus black, subtartareous, thin; scales very minute, scattered or aggregated, subfoliaceous, sublobate or subcrenate, appressed, coarsely wrinkled, pale dusky olive when dry, light green when wet. Apothecia much larger than the scales, resting on the substratum, their summits porous." "Sporidia in asci 8, oblong, unilocular, hyaline."

Endocarpon macrocarpon, Tayl. Fl. Hib. pt. 2. 258.—Leight. Brit. Angi. Lich. 15. pl. 4. fig. 2.

"On Dunkerron Mountain. * * * * The apothecia are many times wider than the scales, globular, pierced above; having a double perithecium, the exterior hard, black, resting on the substratum or surface of the rock; the interior pale flesh-coloured, minutely cellular, rather thick; the nucleus colourless, or transparent. *Taylor.*" I have not seen any specimens.

* * * *Thallus tartareous, contiguous.*

16. VERRUCARIA DUFOURII, DC. Thallus subdeterminate or determinate, thin, tartareous, contiguous, even, somewhat pruinose, greyish-white or pale brown. Apothecia of a medium size, numerous, innate

and inflexed at the base, prominent, truncato-conical, somewhat polished, black; perithecium dimidiate, incurved; ostiolum umbilicato-depressed; nucleus pale, enveloped in a very thin brownish-black tunic; asci clavate, 8 spored; spores oblong, unilocular, subhyaline or hyaline; ·003 to ·0045 in. long, by ·00125 to ·002 in. broad.

Verrucaria Dufourii, DC. Fl. Fr. 2. 318.—Fries L. Ref. 433.—Schær. Enum. 218. L. H. 101!—Massal. Ric. 175.—Kbr. S. L. G. 346.—Nyl. Syn. Pyren. 29.—Hepp Eur. 436!—*V. concinna*, Borr. E. Bot. Suppl. 2623. fig. 1.—Hook. Brit. Fl. 2. 152.—Leight. Brit. Angi. Lich. 50. pl. 22. fig. 3.

On calcareous rocks. Teesdale! Durham, *Rev. J. Harriman.* Kenmare! and White Park! Co. Antrim, *I. Carroll, Esq.* Cullercoats! Cumberland, *Mr. W. Lisle.* Helks Wood! Ingleborough, *Dr. Carrington.*

17. VERRUCARIA PROMINULA, *Nyl.* Thallus thin, subdeterminate or effuse, tartareous, contiguous, rugulose, greyish-white or pale brown. Apothecia large, prominent, scattered, subglobose, black; perithecium entire; ostiolum very slightly depressed, ultimately perforated; nucleus pale; asci short, oblongo-clavate, 8 spored; spores broadly oblong or elliptical, unilocular, more or less filled with a finely granular protoplasm, subhyaline or hyaline; ·0025 in. long, by ·0015 to ·00175 in. broad.

Verrucaria prominula, Nyl.—*V. muralis*, var. Tayl. Fl. Hib. pt. 2. 92 in pt.

On maritime rocks, Kerry! *Dr. Taylor.* This is apparently a very distinct species, and one which may be easily recognised by its large prominent apothecia, and broadly oblong or elliptical unilocular spores. It is quite distinct from *muralis.* A specimen in the herbarium of the *Rev. T. Salwey*, sent to him by *Dr. Taylor* as a variety of *muralis*, is identical with the present species. *Leighton* names another plant from the same locality *V. litoralis*, and describes its spores as *bilocular*, in other respects (judging from his description and figures) the two plants are identical.

18. VERRUCARIA MURINA, *Leight.* Thallus thin, effuse, tartareous, smooth, pale brown. Apothecia of a medium size, prominent, semi-immersed, hemispherico-convex, brownish-black; perithecium entire; ostiolum depressed, at length perforated; asci oblongo-clavate, 8 spored; spores broadly elliptical, unilocular, pale yellow or hyaline; ·005 to ·006 in. long, by ·0025 to .003 in. broad.

Verrucaria murina, Leight. Brit. Angi. Lich. 44. pl. 19. fig. 3.—*V. myriocarpa*, Hepp Eur. 430!—*V. rupestris*, var. Nyl. Syn. Pyren. 32.

On calcareous rocks, mortar of old walls, etc. Near Cork! *I. Carroll, Esq.* Shanklin! Isle of Wight, *Rev. T. Salwey.* This is distinguished from the next species, chiefly by its entire perithecium.

19. VERRUCARIA RUPESTRIS, *Schrad.* Thallus effuse, very variable in thickness, tartareous, contiguous, white, greyish-white or grey. Apothecia of a medium size, numerous, semi-immersed, or subsessile, hemispherical, black; perithecium dimidiate, more or less spreading at the base; ostiolum somewhat depressed, at length dilato-perforated; nucleus pale, enveloped in a thin brown tunic; asci ventricose or subclavate, 8 spored; spores elliptical-oblong or ovate, unilocular, subhyaline or hyaline; ·0035 to ·004 in. long, by ·0015 in. broad.

Verrucaria rupestris, Schrad. Fries L. Ref. 436 in pt.—Hook. Brit. Fl. 2. 152 in pt.—Schær. Enum. 217. L. H. 103 !—Leight. Brit. Angi. Lich. 60. pl. 25. fig. 4. Exs. 140 !—Massal. Ric. 172. fig. 344.—Hepp Eur. 224 !—Kbr. S. L. G. 346.—Nyl. Syn. Pyren. 30 in pt.

On rocks and stones; very common.

β. SUBALBICANS, (*Leight.*) Thallus effuse, very thin, greyish-white or white, often scarcely perceptible. Apothecia small, numerous, immersed only at the base, prominent, hemispherical, black; perithecium dimidiate, slightly spreading at the base; nucleus pale, enveloped in a thin black tunic; spores as in *rupestris.*

Verrucaria subalbicans, Leight. Brit. Angi. Lich. 56. pl. 25. fig. 1. Exs. 200 !

On the mortar of old walls, and on rocks; probably common. Near Ayton ! Cleveland. This form is distinguished from the next one, by its more prominent apothecia, and by the black inner tunic.

γ. MURALIS, (*Ach.*) Thallus effuse, tartareo-farinose, greyish-white, often obliterated. Apothecia of a medium size, irregularly scattered, at first immersed, afterwards partly emersed, hemispherical, naked, black; perithecium dimidiate, more or less spreading at the base; nucleus pale, enveloped in a pale brown tunic; otherwise as in *rupestris.*

Verrucaria muralis, Ach. Meth. 115.—Fries L. Ref. 436. Schær. Enum. 218. L. H. 441.—Massal. Ric. 175. fig. 334.—Hook. Brit. Fl. 2. 154 in pt.—Kbr. S. L. G. 347.—*V. patula*, Leight. Brit. Angi. Lich. 61. pl. 26. fig. 1.—*V. rupestris*, var. Nyl. Syn. Pyren. 32.

On calcareous rocks and stones, and on the mortar of old walls; common.

δ. PURPURASCENS, (*Hoffm.*) Thallus effuse or subdeterminate, thinnish, tartareous, at first contiguous, afterwards more or less rimulose, smooth, pale rose, or rosy-purple slightly tinged with red. Apothecia of a medium size, irregularly scattered, immersed, at length partly emersed, hemispherico-conoid, brownish-black; otherwise as in *rupestris.*

Verrucaria purpurascens, Hoffm.—*V. rupestris*, var. *purpurascens*, Schær. Enum. 217. L. H. 440 !—Nyl. Syn. Pyren. 31.—*V. purpurascens*, Massal. Ric. 173 in pt.—Kbr. S. L. G. 347.

On calcareous rocks. Castle Eden Dean ! Durham. This form may be distinguished at sight by the colour of its thallus; it is however subject to some slight variation. In exposed situations, it is of a dark rosy-purple colour, in more shaded ones, of a light rose.

20. VERRUCARIA CALCISEDA, DC. Thallus effuse, thin, tartareous, subpulverulent, white or greyish-white, often scarcely perceptible. Apothecia minute, usually very numerous, immersed in the thallus and rock beneath, at length slightly emersed, so as to be on a level with the surface of the thallus or a little above it, depresso-hemispherical, black; perithecium entire; ostiolum irregularly fissured or perforated with a simple pore; nucleus pale, gelatinous when moist; asci subclavate, 6-8 spored; spores elliptical-oblong, or ovate, unilocular, subhyaline or hyaline; ·0035 in. long, by ·0015 to ·002 in. broad.

Verrucaria calciseda, DC.—Hepp Eur. 428!—*V. rupestris*, var. *calciseda*, Fries L. Ref. 436 in pt.—Schær. Enum. 217. L. H. 104 in pt.—Massal. Ric. 172. fig. 345.—*V. immersa*, Leight. Exs. 30! (non Leight. Brit. Angi. Lich. 57. pl. 25. fig. 2.)—*Baglietto limborioides*, Massal. Mem. 147.—*B. sphinctrina*, Kbr. S. L. G. 375.—*Limboria sphinctrina*, Nyl. Syn. Pyren. 62.

On calcareous rocks; common. The present species closely resembles, in its habit and external appearance, *Thelidium incavatum*, and *T. immersum*, and unless its spores are examined, it is not easily distinguished from them.

21. Verrucaria mutabilis, *Borr.* Thallus effuse, very thin, filmy, smooth or slightly granular, contiguous or when old minutely rimulose, pale brown, grey, or dark brownish-black. Apothecia very minute, numerous, irregularly scattered or crowded, innate at their base, prominent, hemispherical, more or less polished, black; perithecium dimidiate; ostiolum subpapillate, at length perforated with a very minute pore; nucleus pale, enveloped in a thin brown tunic; asci clavate, 8 spored; spores oblong, unilocular, hyaline; ·003 in. long, by ·001 to ·00125 in. broad.

Verrucaria mutabilis, Borr.—Leight. Brit. Angi. Lich. 55. pl. 24. fig. 3.—*Lichen acrotellus*, Sm. E. Bot. 1712.—*V. striatula*, Hook. Brit. Fl. 2. 155.—*V. acrotella*, Tayl. Fl. Hib. pl. 2. 94.

On stones, little pebbles, etc., in open fields; common. This species is often found in company with states of *rupestris*, and with *papillosa*; it may be recognised from both of them, by its more numerous and much more minute apothecia.

B.—*Perithecium ceraceo-membranaceous, brown; paraphyses distinct.*

22. Verrucaria thelostoma, *Harrim.* Thallus thin, determinate, tartareous, contiguous, or very minutely rimose, greyish-brown. Apothecia of a medium size, numerous, imbedded in thallodal verrucæ, hemispherical, dark-brown; perithecium dimidiate; ostiolum subpapillate; nucleus gelatinous, subhyaline; asci subclavate, 8 spored; spores elliptical-oblong, unilocular, filled with a granular protoplasm, pale yellow slightly tinged with brown; ·004 to ·0045 in. long, by ·002 in. broad.

Verrucaria thelostoma, Harriman in Winch. Bot. Guide, 2. 44.—Nyl. Syn. Pyren. 35.—*Lichen thelostomus*, Sm. E. Bot. 2153.—*Lecanora thelostoma*, Hook. Brit. Fl. 2. 189.—*Segestrella thelostoma*, Leight. Brit. Angi. Lich. 34. pl. 15. fig. 2.

On whinstone rocks, near Eglestone! Durham, *Rev. J. Harriman.*

Sect. 2.—Terricolæ.

C. *Perithecium corneo-carbonaceous, black; paraphyses distinct, very slender.*

23. Verrucaria epigæa, *Ach.* Thallus effuse, thin, mucoso-gelatinous when moist, subleprose when dry, pale brown, grey, or yellowish-green. Apothecia minute, irregularly scattered over the whole thallus, semi-immersed, globose or subampullæform, black;

perithecium entire, the upper or exposed part being rather stouter than the lower; ostiolum perforated with a simple pore; nucleus pale; asci elongato-clavate, 8 spored; spores elliptical-oblong or oblong, unilocular, more or less filled with a finely granular protoplasm, subhyaline; ·004 to ·005 in. long, by ·0015 in. broad.

Verrucaria epigæa, Ach. Meth. 123.—Fries L. Ref. 431.—Hook. Brit. Fl. 2. 155.—Leight. Brit. Angi. Lich. 64. pl. 27. fig. 4.—Kbr. S. L. G. 350.—Hepp Eur. 439 !—Nyl. Syn. Pyren. 35.—*Lichen terrestris*, Sm. E. Bot. 1681.—*Thrombium epigæum,* Schær. Enum. 222, L. H. 106 !—Massal. Ric. 156. fig. 303.

On the ground in barren places, in alpine districts. Teesdale! Durham, *Rev. J. Harriman.* Lancashire! *Mr. R. Jacob.* Ireland! *Miss Hutchins.*

GENUS 4. THELIDIUM, *(Massal.)*

Apothecia solitary, hemispherical or globose, more or less immersed; perithecium entire or dimidiate, for the most part corneo-carbonaceous, black; ostiolum papillate, normally perforated with a simple pore; nucleus when moist gelatinous, hyaline or pale yellowish-brown; paraphyses either indistinct, floccoso-mucilaginous, or distinct, capillary, hyaline; asci ovato-oblong or elongato-cylindrical, each containing 6 or 8 spores; spores elliptical or elliptical-oblong, bilocular or quadrilocular, varying in colour from pale yellow to yellowish-brown. Thallus crustaceous, uniform, or athalline.

SECT. A.—*Paraphyses indistinct; asci ovato-oblong.*

1. THELIDIUM CATARACTARUM, (*Hepp.*) Thallus subdeterminate or effuse, thin, subtartareo-membranaceous, contiguous and somewhat gelatinous when moist, greyish-green, subleprous and pale watery-brown when dry. Apothecia small, evenly scattered, semi-immersed or nearly sessile, the thallus more or less swollen around their base, subglobose, pale brown when moist, brownish-black and somewhat shrivelled when dry; perithecium soft when moist, indurated when dry, dimidiate; nucleus pale, diffluent; asci ventricose, 8 spored; spores elliptical-oblong, or obovate, bi-quadrilocular, often constricted opposite the dissepiments, filled with a grumous protoplasm, pale yellowish-brown, or subhyaline; ·005 to ·008 in. long, by ·002 to ·00275 in. broad.

Sagedia cataractarum, Hepp Eur. 442 ! and *S. Zwackhii*, *β. toficola*, Hepp Eur. 443 !—*Verrucaria margacea*, Leight. Brit. Angi. Lich. 62. pl. 26. fig. 3. (excl. all the syn.) Exs. 319 !—*Thelidium Zwackhii*, Kbr. S. L. G. 355.—*Verrucaria pyrenophora*, Nyl. Syn. Pyren. 26 in pt.

On rocks and stones in the beds of streams and rivulets. Ross Carberry ! Co. Cork, *I. Carroll, Esq.* Streams near Ayton ! Cleveland. In some apothecia the spores are all bilocular, in others all quadrilocular, and in others both bi and quadrilocular. The perithecium in a moist state is pale brown, soft, and plump, in a dry one hard, shrunk, and somewhat difformed.

2. THELIDIUM PYRENOPHORUM, (*Ach.*) Thallus effuse, thinnish, subtartareous, contiguous, or at times somewhat rimulose, smooth, pale yellowish-brown, or brown. Apothecia large, rather sparingly produced,

scattered, sessile, very prominent, hemispherical, black, more or less polished and shining; perithecium dimidiate; ostiolum slightly depressed, ultimately perforated with a small pore; nucleus pale, enveloped in a thin dark-brown tunic; asci large oblongo-clavate, 8 spored; spores elliptical-oblong or obovate, quadrilocular, at times constricted opposite the dissepiments, filled with a grumous protoplasm, pale yellow or subhyaline; ·008 to ·009 in. long, by ·003 to ·004 in. broad.

Verrucaria pyrenophora, Ach. L. Univ. 285.—Nyl. Syn. Pyren. 26 in pt.—*V. Dufourii*, var. *granitica*, Schær. Enum. 218.—*V. Sprucei*, Leight. Brit. Angi. Lich. 54. pl. 23. fig. 4. 5. 6. Exs. 139!—*Sagedia pyrenophora*, Hepp Eur. 97!—*Thelidium pyrenophorum*, Kbr. S. L. G. 353.

On rocks liable to be inundated or suffused with water, in alpine or subalpine districts. Craig-na-Calliach! Perthshire, *Dr. Maingay*. Armagh! *Admiral Jones*. Ross Carberry! Co. Cork, *I. Carroll, Esq.*

3. THELIDIUM INCAVATUM, (*Nyl.*) Thallus subdeterminate, thin, tartareo-farinose, contiguous, smooth, greyish-white. Apothecia of a medium size, numerous, irregularly scattered, deeply immersed in the thallus and rock beneath, hemispherico-globose, black; perithecium entire; ostiolum depressed, at length perforated by a large irregular pore, nucleus gelatinous, pale yellowish-brown or nearly hyaline; asci oblongo-clavate, 8 spored; spores elliptical-oblong, or oblong, normally quadrilocular, at times slightly constricted opposite the dissepiments, filled with a granular protoplasm, pale yellowish-brown or subhyaline; ·008 to ·011 in. long, by ·0035 to ·0045 in. broad. PLATE 5. *fig.* 122.

Verrucaria pyrenophora, var. *incavata*, Nyl. in litt. 1859.

On calcareous rocks. Ingleborough! *Dr. Carrington*. Bilsdale! Yorkshire, and Castle Eden Dean! Durham. This plant bears a general resemblance to *T. immersum*, and is not distinguishable from it except its spores are examined. NYLANDER refers it to *pyrenophorum*, but I think they are quite distinct. Its apothecia are deeply immersed in little cavities of the rock, and the perithecia are entire; while in *pyrenophorum*, they are very prominent, and the perithecia are dimidiate.

4. THELIDIUM IMMERSUM, (*Leight.*) Thallus subdeterminate, very thin, tartareo-farinose, contiguous, white or greyish-white, often surrounded at its circumference by a narrow hypothalline black line. Apothecia of a medium size, numerous, evenly scattered over the whole thallus, deeply immersed in the rock, depresso-hemispherical, black; perithecium entire; ostiolum more or less depressed, eventually perforated by an irregular pore; nucleus, when moist, pale, mucoso-gelatinous; asci broadly clavate, 8 spored; spores elliptical-oblong or linear-oblong, constantly bilocular, subhyaline or hyaline; ·005 to ·007 in. long, by ·002 to ·00275 in. broad. PLATE 5. *fig.* 123.

Verrucaria immersa, Leight. Brit. Angi. Lich. 57. pl. 25. fig. 2.—*V. rupestris*, var. *calciseda*, Auct. in pt.

On calcareous rocks, probably common. Ingleborough! *Dr. Carrington*. Ardglass! Co. Down, *Dr. Maingay*. Limestone ridge at the N.W. slope of Morane! *Admiral Jones*. White Park! Co. Antrim, *I. Carroll, Esq.* Bilsdale! Yorkshire. Care must be taken not to confound this species with the preceding one, nor with *Verrucaria calciseda*, nor *Sphæromphale terebrata*, all of which it resembles, both in its mode of growth and external appearance. The bilocular spores will always distinguish it.

5. Thelidium Borreri, (*Leight.*) Thallus subdeterminate, thin, tartareous, contiguous, or when old subrimulose, greyish-white, at times altogether obliterated. Apothecia large, numerous, slightly immersed at their base, subhemispherical, black; perithecium dimidiate; ostiolum truncate or depressed, at length perforated with a rather large pore; nucleus pale brown, enveloped in a dark-brown tunic; asci subclavato-ventricose, 8 spored; spores broadly oblong or oblong, bilocular, pale yellow or hyaline; ·005 to ·006 in. long, by ·002 to ·00275 in. broad.

Verrucaria Borreri, Leight. Brit. Angi. Lich. 76. pl. 22. fig. 4.—*V. Dufourii,* Borr. E. Bot. Suppl. 2791.—*V. Dufourii, V. epipolia,* and *β. concinna,* Schær. Enum. 218 in pt.—*Sagedia Borreri,* Hepp Eur. 441 !—*Thelidium galbanum,* Kbr. S. L. G. 354.—*V. pyrenophorum,* Nyl. Syn. Pyren. 26 in pt.

On calcareous and schistose rocks in alpine districts. Ben Lawers! *Admiral Jones.* This species may be known from *Salweii* and *conoideum,* both of which it somewhat resembles, by its subclavato-ventricose asci.

* 6. Thelidium elæinum, (*Borr.*) Thallus effuse, thin, tartareous, subrimulose, smooth, greenish-olive when moist, greyish-olive and shining when dry. Apothecia minute, at first innate and covered by the thallus, afterwards erumpent, subsessile and more or less denuded, subhemispherical or conical, black; perithecium dimidiate, acutely incurved at the base; ostiolum eventually perforated by a minute pore; asci clavate, 8 spored; spores linear-oblong or oblong, bilocular, hyaline.

Lichen viridulus, Sm. E. Bot. 2455 (excl, syn.).—*Verrucaria elæina,* Borr. under E. Bot. Suppl. 2623. fig. 2.—Hook. Brit. Fl. 2. 152.—Leight. Brit. Angi. Lich. 63. pl. 27, fig. 2.

" On fissile slate rocks, in shady situations in the West of Ireland, *Miss Hutchins.* I have not seen a specimen of this plant. Is it identical with *Sagedia olivacea,* Hepp Eur. 226?

Sect. B.—*Paraphyses distinct; asci elongato-cylindrical.*

7. Thelidium Salweii, (*Leight.*) Thallus effuse, thin, subtartareo-farinose, white or greyish-white; at times nearly altogether obliterated. Apothecia very large, irregularly scattered, sessile, hemispherico-convex, black; perithecium entire; ositolum depressed, at length perforated by a rather large pore; asci elongato-cylindrical, 8 spored, uniserial; spores elliptical-oblong or oblong, bilocular, subhyaline or hyaline; ·005 to ·006 in. long, by ·002 to ·0025 in. broad.

Verrucaria Salweii, Leight.—*V. gemmata* var. *Salweii,* Nyl. Syn. Pyren. 54.

On calcareous rocks, mortar of old walls, etc. Llanforda Lane! near Oswestry, *Rev. T. Salwey.* Distinguished from *conoideum,* by its entire perithecium; in other respects they are similar.

8. Thelidium conoideum, (*Fries.*) Thallus effuse, thin, tartareo-farinose, contiguous or rimulose, dull greyish-white or grey. Apothecia very large, irregularly scattered, subinnato-sessile, conico-hemispherical,

black; perithecium dimidiate, more or less spreading at the base; ostiolum depressed, at length perforated by a simple pore; nucleus gelatinous, white, enveloped in a pale tunic; asci elongato-cylindrical, 8 spored; spores oblong or elliptical-oblong, constantly bilocular, pale yellow or hyaline; ·004 to ·006 in. long, by ·0015 to ·0025 in. broad.

Verrucaria conoidea, Fries. L. Ref. 432.—*V. epipolæa*, Borr. E. Bot. Suppl. 2647. fig. 3.—Hook. Brit. Fl. 2. 154.—Leight. Brit. Angi. Lich. 61. pl. 26. fig. 2. Exs. 31 !—Schær. Enum. 218 in pt.—*Arthopyrenia epipolæa*, Massal. Ric. 166. fig. 330.—*Acrocordia conoidea*, Kbr. S. L. G. 358.—*Verrucaria gemmata*, var. *conoidea*, Nyl. Syn. Pyren. 53.

On calcareous rocks, old walls, etc. Near Kenmare! *I. Carroll, Esq.* Ingleborough! *Dr. Carrington.* Great Orme's Head! Caernarvonshire, *Rev. W. A. Leighton.* Bilsdale! Yorkshire, *I. G. Baker, Esq.* Near Clifton! Bristol, *Miss M. Atwood.* Pinchingthorp Wood! and near Ingleby! Cleveland. This species may be readily known by its large prominent apothecia, dimidiate perithecium, and elongato-cylindrical asci.

9. THELIDIUM GEMMATUM, (*Ach.*) Thallus effuse, very thin, membranaceous, smooth or subpulverulent, white or greyish-white. Apothecia large, not very numerous, irregularly and at times distantly scattered, sessile, prominent, conico-hemispherical, black, dull, naked or slightly pruinose; perithecium dimidiate; ostiolum usually papillate, at length perforated with a simple pore; nucleus white, gelatinous, enveloped in a pale brown tunic; asci elongato-cylindrical, 8 spored; spores broadly oblong, constantly bilocular, each loculus often containing a pale yellow globule or nucleus, subhyaline or hyaline; ·0035 to 004· in. long, by ·00175 to ·002 in. broad.

Verrucaria gemmata, Ach. L. Univ. 278.—Borr. in E. Bot. Suppl. 2617. fig. 2.—Hook. Brit. Fl. 2. 150.—Fries L. Ref. 444.—Leight. Brit. Angi. Lich. 43. pl. 18. fig. 4. 5. Exs. 136 !—Nyl. Syn. Pyren. 53. L. P. 93 !—*V. alba*, Schær. Enum. 219. L. H. 105 in pt.—*Arthopyrenia gemmata*, Massal. Ric. 166. fig. 328.—*Pyrenula gemmata*, Hepp Eur. 104 !—*Acrocordia gemmata*, Kbr. S. L. G. 356.

On the trunks of trees, in shady woods, etc.; common. I greatly doubt whether this is anything more than a corticole state of the preceding species. The structure of their apothecia is very often identical.

10. THELIDIUM BIFORMIS, (*Borr.*) Thallus effuse or subdeterminate, tartareo-membranaceous, rimulose, smooth or somewhat rugulose, white or greyish-white; at times surrounded at its circumference by a narrow hypothalline black line. Apothecia small or of a medium size, very numerous, scattered or crowded, innato-sessile, prominent, hemispherico-globose, black; perithecium entire; ostiolum normally perforated with a minute simple pore, eventually more or less enlarged and difformed; nucleus white; asci cylindrical, 8 spored; spores oblong or obovate, unequally bilocular, each loculus often containing one or two pale yellow globules, subhyaline or hyaline; ·0025 to ·00325 in. long, by ·001 to ·0015 in. broad.

Verrucaria biformis, Borr. in E. Bot. Suppl. 2617. fig. 1.—Fries L. Ref. 446.—Hook. Brit. Fl. 2. 150.—Leight. Brit. Angi. Lich. 37. pl.

16. fig. 2. Exs. 100!—Nyl. Syn. Pyren. 54. L. P. 91! 92!—*Lembidium polycarpum,* Kbr. S. L. G. 359.

On the trunks of trees; common. This species may be known from *gemmata,* its nearest ally, by the apothecia being much more numerous, and much smaller in size, by the perithecia being entire, and by the spores being more minute and rather different in their internal organization.

SECT. C.—*Thallus none; species athalline.*

11. THELIDIUM AGGREGATUM, *Mudd.* Thallus none. Apothecia parasitic on the thallus of *Aspicilia calcarea,* very minute, aggregated together into little groups, of from three to twelve apothecia, semi-immersed, hemispherico-globose, black; perithecium entire, the upper half very black, the lower one reddish-black; nucleus pale, submucoso-gelatinous; paraphyses indistinct; asci clavate, 8 spored; spores linear-oblong, or oblongo-subfusiform, bilocular, subhyaline or hyaline; ·005 to ·007 in. long, by ·001 to ·002 in. broad.

Parasitic on the thallus of *Aspicilia calcarea;* on Barclays Rock! *Admiral Jones.* The place of growth, very minute aggregated apothecia, submucoso-gelatinous nuclei, clavate 8 spored asci, and large spores, are characters which, if due attention be paid to them, will always identify this species.

12. THELIDIUM EPIPOLYTROPUM, *Mudd.* Thallus none. Apothecia parasitic on the thallus of *Lecanora polytropa,* and at times on that of *Squamaria saxicola,* very minute, numerous, irregularly scattered over the alien thallus, immersed or semi-immersed, globose, black; ostiolum very minutely depressed, eventually perforated with a very minute pore; nucleus pale; paraphyses distinct, very fine and delicate, capillary; asci short, subcylindrical or oblongo-subclavate, 4, 6, or 8 spored; spores oblong or subfusiform, constantly bilocular, hyaline; ·003 to ·0035 in. long, by ·00075 to ·001 in. broad.

Parasitic on the thallus of *Lecanora polytropa;* Highlands of Scotland! *Admiral Jones.* Ayton Moor! Cleveland. On the thallus of *Squamaria saxicola;* Cliffrigg! near Ayton, Cleveland. Both the present and preceding species are apparently very distinct, but owing to their diminutive size, they may be easily passed over, unless specially looked for.

GENUS 5. PYRENULA, *(Ach.)*

Apothecia solitary, globose, at first immersed in and covered by the thallus, ultimately emerso-sessile; perithecium corneo-carbonaceous, black; ostiolum papillate, at length perforated with a simple pore; nucleus gelatinous, brown when dry, white when moist; paraphyses distinct, capillary, lax, subdiffluent; asci elongato-clavate, 8 spored; spores elliptical-oblong, or oblong, quadrilocular, each loculus containing an angular or rounded globule or nucleus, coloured. Thallus crustaceous, membranaceo-cartilaginous, uniform.

1. PYRENULA NITIDA, (*Weig.*) Thallus determinate, contiguous, membranaceo-cartilaginous, smooth, waxy, more or less polished and shining, olive-brown, or pale olive. Apothecia large, numerous, at first

immersed in and covered by the thallus, eventually more or less emersed and exposed, hemispherico-globose, black; perithecium entire; ostiolum papillate, at length perforated; asci subcylindrico-clavate, 8 spored; spores elliptical-oblong, quadrilocular, each loculus containing an angular pale globule, pale brown or dark-brown; ·005 to ·007 in. long, by ·002 to ·0025 in. broad. PLATE 5. *fig.* 124.

Sphæria nitida, Weig.—*Verrucaria nitida,* Schrad.—Ach. L. Univ. 279.—Borr. E. Bot. Suppl. 2607. fig. 1.—Fries L. Ref. 443.—Hook. Brit. Fl. 2. 149.—Leight. Brit. Angi. Lich. 35. pl. 15. fig. 3. Exs. 27!—Nyl. Syn. Pyren. 45.—*Pyrenula nitida,* Ach. Syn. 125.—Schær. Enum. 212. L. H. 111!—Massal. Ric. 162. fig. 317.—Kbr. S. L. G. 359.—Hepp Eur. 467!

b. NITIDELLA, *Flk.* Thallus thin. Apothecia about one-half the size of those of *nitida.*

Verrucaria nitida, β. nitidella, Flk. D. L. 10.—*V. nitida,* var. *minor,* Leight. Exs. 28!—*Pyrenula nitida,* var. *minor,* Hepp Eur. 468!

β. DERMATODES, (*Borr.*) Thallus subdeterminate, thin, membranaceo-cartilaginous, smooth, cream-colour. Apothecia at first immersed in the thallus, punctiform, afterwards emersed, naked, subsessile, hemispherico-globose, black; perithecium entire; ostiolum eventually perforated; asci 8 spored; spores elliptical-oblong, quadrilocular, each loculus containing an irregularly rounded globule, pale brown, ·003 to ·00375 in. long, by ·0015 to ·00175 in. broad.

Verrucaria dermatodes, Borr. E. Bot. Suppl. 2607. fig. 2.—Hook. Brit. Fl. 2. 149.—Tayl. Fl. Hib. pt. 2. 87.—*V. nitida, β. dermatodes,* Leight. Brit. Angi. Lich. 36. pl. 15. fig. 4.

On the smooth bark of trees. α.—Gloddaeth! near Conway, Caernarvonshire, *Rev. W. A. Leighton.* Ardglass! Co. Down, *Dr. Maingay.* Helks Wood, Ingleborough! *Dr. Carrington.* Clifton, near Bristol! *Miss M. Atwood.* Castle Eden Dean! Durham. Bilsdale! Yorkshire. Kildale! Cleveland. β.—Near Killarney! Ireland, *I. Carroll, Esq.* This form may be recognised by its thin yellowish cream-coloured thallus, smaller and eventually more exposed apothecia, and smaller spores. Both forms are easily distinguished by the waxy appearance of their thalli; *nitida,* is one of the largest and most elegant of the British Verrucariæ.

GENUS 6. ARTHOPYRENIA, (*Massal.*)

Apothecia solitary, hemispherical or globose, semi-immersed or sessile; perithecium corneo-carbonaceous, black, entire, or dimidiate; ostiolum more or less depressed, ultimately perforated with a simple pore; nucleus pale, gelatinous when moist; paraphyses distinct, capillary, or indistinct, mucoso-macilaginous; asci clavato-lanceolate, or ovato-oblong, 8 spored; spores acicular, fusiform, or linear-oblong, 2, 4, 6, or 8 locular, uncoloured. Thallus membranaceo-crustaceous, often indistinct.

SECT. A. *Spores normally fusiform.*

* 1. ARTHOPYRENIA LUCENS, (*Tayl.*) Thallus subdeterminate, thin, tartareous, contiguous or minutely rimulose, dark purplish-brown or greyish-brown. Apothecia of a medium size, evenly scattered or congregated together into groups of three or four, sessile, prominent, conico-

hemispherical, black, more or less polished and shining; perithecium dimidiate; ostiolum at length perforated with a minute pore; nucleus white, enveloped in a pale tunic; asci 8 spored; spores elongato-fusiform, 8 locular, hyaline.

Verrucaria lucens, Tayl. Fl. Hib. pt. 2. 257.—Leight. Brit. Angi. Lich. 55. pl, 24. fig. 2.

On rocks and stones. Ireland! *Dr. Taylor.* I am very doubtful whether this is a distinct species or only a state of *macularis.* A specimen collected by *Mr. Moore,* in the Co. of Kerry and named by *Taylor,* "*V. lucens,*" agrees in every respect with his description, but its spores show that it is only a state of *macularis,* they being constantly quadrilocular.

2. Arthopyrenia linearis, (*Leight.*) Thallus somewhat effuse, thin, tartareous, contiguous or minutely rimulose, greyish-white. Apothecia minute, numerous, irregularly scattered over the whole thallus, subinnate, prominent, hemispherical, black; perithecium dimidiate, incurved at the base; ostiolum truncate, slightly depressed, at length perforated; nucleus pale, enveloped in a pale brown tunic; asci clavato-lanceolate, 8 spored; spores linear, rounded at the extremities, quadrilocular, hyaline.

Verrucaria linearis, Leight. Brit. Angi. Lich. 52. pl. 23. fig. 1.

On calcareous rocks. Cheddar! *Mr. Borrer.* I have not seen a specimen of this species.

* 3. Arthopyrenia umbrosa, (*Tayl.*) Thallus effuse, subtartareous, leproso-squamulose, smooth when young, afterwards subsorediiferous, olive-brown. Apothecia small, not very numerous, scattered in a very irregular manner, subinnate, rugose, difformed, black; perithecium entire; nucleus pale; paraphyses distinct, capillary, flexuose; asci narrow, clavate, 8 spored; spores fusiform, quadrilocular, hyaline; ·005 to ·0055 in. long, by ·001 in. broad.

Verrucaria umbrosa, Tayl. Fl. Hib. pt. 2. 97.—Leight. Brit. Angi. Lich. 48 pl. 21. fig. 3.

On shaded rocks. County of Kerry! *Dr. Taylor.* This is one of those curious-looking things which it is difficult to decide what to do with; nevertheless they should not be passed over nor altogether discarded on that account. I am unable to decide in the present instance whether this plant ought to be regarded as a distinct species, or as an altered state of *macularis.* Its thallus, when young, consists of very minute olive-brown squamules, which through approximation become confluent, and at times congregated into little rugosities or heaps, eventually these dissolve into a pale yellow powder, causing it to have a sorediiferous aspect. Its apothecia are sparingly scattered, small, partly imbedded in the rugosities or thallus, rugose, black, difformed and clumsy looking. If it had not been known for a certainty that the external appearance of lichens varied in different situations, this species might have been regarded as quite distinct; as it is, there is room for doubt. I leave it here for the present. According to the note in *Leighton's* Angi. Lich. 48, *Dr. Taylor,* regarded *umbrosa* as an Opegrapha. The internal structure of its apothecia shows to which *division* it belongs.

4. Arthopyrenia macularis, (*Wallr.*) Thallus at first macular,

determinate, afterwards effuse, thin, submucoso-gelatinous when moist, contiguous, greenish-olive or brown. Apothecia minute, very numerous, evenly scattered over the whole thallus, sessile or slightly immersed at their base, prominent, hemispherical, black; perithecium dimidiate; ostiolum papillate, at length perforated with a very minute pore; asci sublanceolate, 8 spored; spores fusiform, quadrilocular, hyaline; ·003 to ·004 in. long, by ·00075 in. broad. PLATE 5. fig. 125.

Verrucaria macularis, Wallr.—Schær. Enum. 213.—*V. chlorotica*, Ach. Syn. 94 in pt.—Schær. Enum. 213 in pt. L. H. 523 ! in pt.—Nyl. Syn. Pyren. 36 in pt.—*Sagedia chlorotica*, Massal. Ric. 159. fig. 309.—*S. macularis*, Kbr. S. L. G. 263.

On rocks and stones in moist shady situations; frequent. Easily recognised by its olive or brown thallus, and very numerous minute apothecia.

β. CODONOIDEA, (*Leight.*) Thallus filmy, often altogether obliterated. Apothecia minute, prominent, hemispherical, black; otherwise as above.

Verrucaria codonoidea, Leight. Brit. Angi. Lich. 53. pl. 23. fig. 3. Exs. 138 !

On rocks and stones in open situations. Haughmond Hill ! Shropshire, *Rev. W. A. Leighton*. Langbraugh-rigg ! near Ayton. This is evidently nothing more than a state of *macularis*, in which the thallus is either much thinner, or altogether absent.

γ. TRACHONA, (*Tayl.*) Thallus subdeterminate or effuse, membranaceo-tartareous, contiguous, or when old minutely rimulose, olive-green, or olive-brown. Apothecia minute, unequal in size, irregularly scattered, subinnato-sessile, prominent, hemispherical, black; perithecium dimidiate; nucleus pale when moist, enveloped in a brown tunic; asci and spores as in *macularis*.

Verrucaria trachona, Tayl. Fl. Hib. pt. 2. 93, excl. syn.—Leight. Brit. Angi. Lich. 50. pl. 22. fig. 1.—*V. perminuta*, Deakin.

On rocks and stones in shaded situations. Kilcully ! Cork, *I. Carroll, Esq.* Penzance ! *Rev. T. Salwey.* Bilsdale ! Yorkshire. The internal structure of the apothecia, and the form of the asci and the spores, show that this is only a variety of *macularis*. It may be known by the green hue of its thallus.

δ. FUSIFORMIS, (*Leight.*) Thallus macular-determinate, or effuse, very thin, membranaceous, contiguous, smooth, or subrugulose, olive-brown or brown. Apothecia minute, numerous, evenly scattered, sessile, hemispherical, black; perithecium dimidiate; ostiolum papillate; pore often indistinct; asci and spores as in *macularis*.

Verrucaria fusiformis, Leight. Brit. Angi. Lich. 42, pl. 18. fig. 2. Exs. 99 !—*V. carpinea*, Ach. L. Univ. 281 in pt.—Schær. Enum. 221. L. H. 525 !—*V. chlorotica*, var. *carpinea*, Nyl. L. P. 96 ! Syn. Pyren. 36 in pt.—*Sagedia carpinea*, Massal. Ric. 160. fig. 310.—*S. ænea*, Kbr. S. L. G. 364.—*Pyrenula fusiformis*, Hepp Eur. 459 !

On the trunks of trees in moist shaded woods; frequent. This appears to me to be only the corticole state of *macularis*. The structure of their apothecia is identical.

5. ARTHOPYRENIA OLIVACEA, (*Borr.*) Thallus effuse, thin, mem-

branaceous, contiguous when young, rimose when old, smooth or subrugulose, olive-green or nearly black. Apothecia minute, evenly and rather distantly scattered over the whole thallus, slightly immersed at their base, prominent, hemispherical, dull black; perithecium dimidiate; ostiolum slightly depressed, at length perforated with a minute simple pore; nucleus white, enveloped in a pale tunic; asci elongato-lanceolate, 8 spored; spores clavato-fusiform, 4 to 8 locular, subhyaline or hyaline; ·006 to ·008 in. long, by ·001 in. broad.

Verrucaria olivacea, Borr. in E. Bot. Suppl. 2597. fig. 1.—Hook. Brit. Fl. 2. 150.—Tayl. Fl. Hib. pt. 2. 89.—Leight. Brit. Angi. Lich. 42. pl. 18. fig. 1. Exs. 199!—*V. chlorotica,* Nyl. Syn. Pyren. 36 in pt.

On the trunks of trees in shaded woods. Easby Wood! Sowerdale! and in Hoggarts Wood! Ingleby, Cleveland. NYLANDER unites this species to *chlorotica* (macularis), but I see no good reason for doing so. It is equally as distinct and its characters as constant as any other in the present genus. They resemble each other externally, but the size, form, and internal organization of their spores, are very different.

SECT. B.—*Spores normally linear-oblong, bilocular.*

6. ARTHOPYRENIA TAYLORI, (*Carr.*) Thallus macular-determinate, thin, membranaceous, contiguous or very minutely rimulose, subrugulose, olive-brown. Apothecia minute, numerous, irregularly scattered, semi-immersed, hemispherico-globose, dull black, more or less invested with the thallus; perithecium entire; ostiolum papillate, at length very slightly depressed and perforated with a simple pore; nucleus pale, gelatinous; paraphyses distinct, capillary; asci lanceolate, 8 spored; spores subfusiform, distracto-bilocular, hyaline; ·005 to ·006 in. long, by ·001 in. broad.

Verrucaria Taylori, Carroll.—Nyl. Syn. Pyren. 82.

On the trunks of ash trees near Cork! Ireland, *I. Carroll, Esq.* This species is distinguished from both the preceding, which it closely resembles, by its entire perithecium, and distracto-bilocular spores. The asci are remarkably tough, and the spores difficult to separate from them. In all such cases I have found the application of *hot water,* or a little acidulated water, to be exceedingly useful.

7. ARTHOPYRENIA FUMAGO, (Wallr.) Thallus at first macular-determinate, afterwards effuse, very thin, membranaceous, contiguous, smooth, forming horizontal patches of a brownish-black or black colour, Apothecia very minute, numerous, evenly scattered, subinnate, prominent, hemispherical, black; perithecium dimidiate, incurved at the base; ostiolum slightly depressed, eventually perforated; nucleus pale, enveloped in a thin brown tunic; asci obovate, 8 spored; spores linear-oblong, unequally bilocular, often constricted opposite the dissepiment, each loculus containing one or two pale yellow globules, hyaline; ·004 to ·005 in. long, by ·001 in. broad.

Verrucaria fumago, Wallr.—Schær. Enum. 220.—*Arthopyrenia fumago,* Kbr. S. L. G. 370.—*V. Laburni,* Leight. Brit. Exs. 254!

On the smooth bark of trees, especially limes, laburnums, and poplars. Near Ayton! Cleveland. Easily recognised by its thin black thallus, and numerous minute apothecia.

8. ARTHOPYRENIA RHYPONTA, (*Ach.*) Thallus macular-determinate, very thin, filmy, contiguous, smooth or subrugulose, brownish-black or black. Apothecia very minute, sparingly produced, usually congregated together in groups, innato-sessile, prominent, subhemispherical, dull black, or at times slightly polished and shining; perithecium entire; ostiolum subpapillate; asci elongato-clavate, 8 spored; spores linear-oblong or obovate, unequally bilocular, slightly constricted opposite the dissepiment, each loculus often containing one or two pale yellow globules, hyaline; ·003 to .004 in. long, by ·00075 to ·001 in. broad.

Verrucaria rhyponta, Ach. L. Univ. 282.—Borr. E. Bot. Suppl. 2597. fig. 2.—Fries L. Ref. 448.—Hook. Brit. Fl. 2. 150.—Schær. Enum. 220, L. H. 591!—Leight. Brit. Angi. Lich. 37. pl. 16. fig. 1.—Nyl. Syn. Pyren. 60. in pt.—*Pyrenula rhyponta,* Hepp Eur. 449!

On the smooth bark of young trees, also often occurring as minute maculæ on the thallus of *Graphis scripta.* Malham! *Dr. Carrington.* Hoggarts Wood! and Easby Wood! Cleveland.

9. ARTHOPYRENIA NITESCENS, (*Salw.*) Thallus subdeterminate, thin, membranaceous, smooth, contiguous or subrimulose, cream-colour or brownish-white, often slightly tinged with rose. Apothecia small, very numerous, scattered in an irregular manner over the whole thallus, semi-immersed, subglobose, black; perithecium dimidiate, incurved at the base; ostiolum papillate, at length perforated with a very minute pore; nucleus white, enveloped in a pale brown tunic; asci ventricose or obovate, 8 spored; spores linear-oblong or obtusely fusiform, subdistracto-bilocular, the upper loculus rather broader and shorter than the lower one, hyaline; ·004 to ·005 in. long, by ·001 to ·00125 in. broad.

Verrucaria nitescens, Salwey Obs. Penz. Lich. 140. 1853.

On the smooth bark of hollies in mountainous woods. Penzance! *Rev. T. Salwey.* Hoggarts Wood! Ingleby! and in Westerdale! Cleveland. This is a very pretty looking species, and I think quite distinct from all the forms of *epidermidis.* It may be known by the colour of its thallus, and its very numerous semi-immersed small subglobose apothecia.

10. ARTHOPYRENIA EPIDERMIDIS, (*Ach.*) Thallus determinate or effuse, membranaceous, thin, smooth or subrugulose, variously coloured. Apothecia innato-sessile, more or less prominent, black; perithecium dimidiate; ostiolum papillate or slightly depressed, at length perforated with a simple pore; asci 8 spored; spores linear-oblong, oblong, or obovate, normally bilocular, slightly constricted opposite the dissepiment, each loculus containing one or two pale yellow globules, subhyaline or hyaline.

Verrucaria epidermidis, Ach. L. Univ. 276.—Fries L. Ref. 447.—Schær. Enum. 219.—Nyl. Syn. Pyren. 58 in pt.

α. FALLAX, (*Nyl.*) Thallus at first determinate, afterwards effuse, very thin, membranaceous, contiguous, smooth or subrugulose, greyish-white or pale olive-brown. Apothecia large, numerous, irregularly scattered, subinnato-sessile, hemispherico-conoid, their outline subelliptical, black, somewhat polished and shining; ostiolum slightly depressed and eventually perforated with a rather large pore; nucleus gelatinous, pale; paraphyses distinct, capillary; asci obovato-clavate or subcylindrical, 8 spored; spores oblong or linear-oblong, unequally bilocular, each loculus containing one or two pale yellow globules, hyaline; ·005 to ·006 in. long, by ·00175 to ·002 in. broad. PLATE 5. *fig.* 126.

Verrucaria epidermidis, var. *fallax*, Nyl. Syn. Pyren. 59.—*V. epidermidis*, varr. *vulgaris* and *grisea*, Schær Enum. 220. L. H. 107! *Arthopyrenia epidermidis*, and *A. Betula*, Massal. Ric. 167. 169.—*Pyrenula punctiformis*, var. *fallax*, Hepp Eur. 450!

On the smooth bark of trees, chiefly birches; common.

β. ANALEPTA, (*Ach.*) Thallus subdeterminate or determinate, very thin, membranaceous, smooth, shining, pale olive or olive-brown. Apothecia of a medium size, not very numerous, scattered, subinnato-sessile, prominent, hemispherico-conoid, black, more or less polished; paraphyses more or less distinct; spores linear-oblong, subdistracto-bilocular; ·005 in. long, by ·0015 in. broad; otherwise as above.

Lichen analeptus, Ach. Prod. 15.—Sm. E. Bot. 1848.—*Verrucaria epidermidis*, α. Fries L. Ref. 447.—β. Hook. Brit. Fl. 2. 149.—Leight. Brit. Angi. Lich. 40 pl. 17. fig. 4. Exs. 29!—*V. analepta*, Schær. Enum. 221. L. H. 287!—*Arthopyrenia analepta*, Mass. Ric. 165. fig. 326.—*Pyrenula punctiformis*, var. Hepp Eur. 451!

b. MESPYLI, *Massal.* Apothecia conoid; ostiolum slightly depressed; otherwise as above.

Arthopyrenia analepta, var. *mespyli*, Massal. Ric. 165.

c. CORYLI, *Hepp.* Thallus determinate, membranaceous, greyish-olive; otherwise as above.

Pyrenula punctiformis, var. *coryli*, Hepp Eur. 452!

d. ACERINI, Hepp. Thallus determinate, thin, smooth, shining, olive-brown; otherwise as above.

Pyrenula punctiformis, var. *acerini*, Hepp Eur. 454!

On the smooth bark of trees; α—chiefly on oaks, limes, and hawthorns; b—on *Mespilus germanica;* c—on hazels; d—on sycamores; all more or less common.

γ. LACTEA, (*Ach.*) Thallus determinate, thin, membranaceous, contiguous, smooth, cream-colour, often surrounded at the circumference by a narrow brown hypothalline line. Apothecia of a medium size, not very numerous, hemispherico-conoid, black, naked or slightly pruinose; nucleus submucoso-mucilaginous; paraphyses not truly distinct; asci clavato-subventricose; otherwise as in *analepta*.

Verrucaria stigmatella, var. *lactea*, Ach. L. Univ. 277.—*V. punctiformis*, var. *lactea*, Schær. Enum. 220.—*Pyrenula punctiformis*, var. *lactea*, Hepp Eur. 455!

On the smooth bark of young trees, chiefly sycamores; probably common. Kildale! and in Easby Wood! Cleveland. This form resembles *analepta* in its habit, and in the form of its apothecia, but differs in the colour of its thallus.

δ. CINEREA, (*Pers.*) Thallus subdeterminate, thin, membranaceous, ntiguous, smooth, polished and shining, greyish-olive. Apothecia small, numerous, innato-sessile, hemispherico-convex, black, naked or covered with the thin filmy epithallus; perithecium dimidiate, often very much incurved at the base; pore minute; nucleus mucoso-gelatinous; paraphyses not very distinct; asci oblongo-subclavate, 8 spored; spores oblong, more or less attenuated towards the extremities, normally bilocular, constricted in the middle, hyaline, ·005 in. long, by ·001 in. broad.

Verrucaria cinerea, Pers.—Hook. Brit. Fl. 2. 149.—Leight. Brit. Angi. Lich. 39. pl. 17. fig. 2., Exs. 343!—*Lichen stigmatellus,* Sm. E. Bot. 1891.

On the smooth bark of hollies in mountainous woods; frequent.

ε. PUNCTIFORMIS, (*Ach.*) Thallus subdeterminate, very thin, filmy, smooth, polished and shining, greenish-olive or pale brown. Apothecia small, numerous, evenly scattered, innato-sessile, hemispherico-subconoid, black; ostiolum slightly depressed, at length perforated with a rather large pore; otherwise as in *cinerea.*

Lichen punctiformis, Ach. Prod. 18.—Sm. E. Bot. 2412.—*Verrucaria punctiformis,* Hook. Brit. Fl. 2. 150.—Leight. Brit. Angi. Lich. 41. pl. 17. fig. 5.—*Arthopyrenia fraxinea,* Massal. Ric. 167. fig. 333.—*Pyrenula punct.,* var. *fraxinea,* Hepp Eur. 453!

On the smooth bark of young ash trees, in moist shaded woods; frequent.

ζ. CINEREO-PRUINOSA, (*Schær.*) Thallus subdeterminate, very thin, filmy, greyish-white. Apothecia minute, numerous, irregularly scattered, innato-sessile, hemispherical, black, cinereo-pruinose, or covered with the thin filmy epithallus. Spores normally bilocular, subhyaline; otherwise as in *cinerea.*

Verrucaria cinereo-pruinosa, Schær. Enum. 221. Leight. Exs. 197! —*Pyrenula cinereo-pruinosa,* a. et b. Hepp Eur. 105! 106!

b. GALACTITES, (DC.) Thallus white or greyish-white. Apothecia minute, very numerous, prominent, naked or slightly pruinose.

Verrucaria galactites, DC.—*Pyrenula punctiformis,* var. Hepp Eur. 107!—*V. cinereo-pruinosa,* var. *galactites,* Schær. Enum. 221.

On the smooth bark of trees, in mountainous woods; frequent.

η. ATOMARIA, (*Ach.*) Thallus subdeterminate or effuse, very thin, filmy, smooth, more or less polished and shining, varying in colour from a pale watery-brown to a pale copper. Apothecia very minute, numerous, often crowded, innato-sessile, prominent, hemispherical, black; ostiolum minutely depressed, at length perforated; nucleus mucoso-mucilaginous, pale; paraphyses indistinct; asci broadly-oblong, or oblongo-ventricose, 8 spored; spores sublinear-oblong, unequally bilocular, each loculus containing one or two rounded pale yellow globules, hyaline; ·003 to ·004 in. long, by ·001 in. broad.

Verrucaria stigmatella, var. *atomaria,* Ach. Syn. 88.—*V. epidermidis,* and *V. punctiformis,* Leight. Exs. 288! 344!—*Pyrenula punctiformis,* var. *atomaria,* Hepp Eur. 456! *including all the subvarieties.*

On the smooth bark of trees; very common. The whole of the forms here described are evidently only states of one species. In both the structure of their apothecia, and in the internal organization of their spores, they bear a general resemblance to each other. Their distinctive features are chiefly external, such as the colour of their thalli, and size of their apothecia.

I may observe here that *Verrucaria Lyellii*, Leight., is omitted, as its apothecia do not contain the least trace of either asci or paraphyses, the spores being free, of a linear-oblong figure, bilocular, hyaline; ·00125 in. long, by ·0005 in. broad.

SECT. C.—*Spores acicular, more or less curved, 2 to 8 locular.*

11. ARTHOPYRENIA OXYSPORA, (*Nyl.*) Thallus effuse, very thin, filmy, greyish-white, often imperceptible. Apothecia minute, irregularly scattered, at first immersed in the thin epidermis of the bark, afterwards emersed, sessile, elliptico-hemispherical, black; perithecium dimidiate; ostiolum at length perforated with a minute pore; nucleus pale, subgelatinous; paraphyses indistinct; asci linear-clavate, 8 spored; spores acicular, more or less curved, 2, 4, 6, or 8 locular, hyaline; ·005 to ·006 in. long, by ·0005 in. broad. PLATE 5. *fig.* 127.

Verrucaria oxyspora, Nyl. in Bot. Notis 1852. p. 179. L. P. 149! Syn. Pyren. 61.—*Leptorhaphis oxyspora*, Kbr. S. L. G. 371.—*Pyrenula oxyspora*, Hepp Eur. 460.—*Verrucaria epidermidis*, Auct. in pt.

On the thin epidermis of the bark of birch, in mountainous woods. Hoggarts Wood! Ingleby! Baysdale! and near Ayton! Cleveland. This is a very distinct species, and one that is well characterised by the form and internal organization of its spores. In all probability it will be found to be of frequent occurrence; it having been hitherto passed over as a state of *A. epidermidis*.

GENUS 7. MICROTHELIA, (*Kbr.*)

Apothecia solitary, minute, hemispherical or globose, innato-sessile; perithecium corneo-carbonaceous, black, entire or dimidiate; ostiolum normally perforated with a minute simple pore; nucleus gelatinous, hyaline when moist, pale yellowish-brown when dry; asci elongato-clavate or cylindrical, 8 or from 32 to 50 spored; spores elliptical, oblong, or oblongo-subfusiform, bilocular or quadrilocular, coloured. Thallus crustaceous, or none; species athalline; parasitic on the thallus of various crustaceous lichens.

1. MICROTHELIA RUGULOSA, (*Borr.*) Thallus effuse, rather thick, tartareous, rimoso-areolate, smooth, cream-colour or pale brown. Apothecia minute numerous, more or less crowded, semi-immersed, hemispherico-conoid, black; perithecium entire; ostiolum perforated with a minute simple pore; paraphyses diffluent; asci oblongo-clavate, 8 spored; spores oblong, bilocular, dark-brown; ·00225 to ·003 in. long, by ·001 in. broad.

Verrucaria rugulosa, Borr.—Leight. Brit. Angi. Lich. 47. pl. 21. fig. 1.

On rocks, old walls, stones, etc. Near Lewes! Sussex, *W. Unwin, Esq*. Distinguished from *gemmifera*, by its thallus, larger apothecia and spores.

2. MICROTHELIA CALCARICOLA, *Mudd.* Thallus none. Apothecia parasitic on the thallus of *Aspicilia calcarea*, and of *A. gibbosa*, of a medium size, irregularly scattered over the alien thallus, sessile or

slightly immersed at their base, globose, black; perithecium entire; inner tunic yellowish-brown; ostiolum at length perforated with a rather large pore; paraphyses dissolved; asci clavato-subventricose, 8 spored; spores elliptical-oblong, bilocular, pale olive-green or olive-brown; ·003 to ·004 in. long, by ·001 in. broad. PLATE 5. *fig.* 128.

Parasitic on the thallus of *Aspicilia calcarea;* Killing! Ireland, *Admiral Jones.* On the thallus of *A. gibbosa;* near Lewes! Sussex, *W. Unwin, Esq.* This plant may be easily recognised by its place of growth, sessile apothecia, large perforations, and by the size of its spores.

3. MICROTHELIA GEMMIFERA, (*Tayl.*) Thallus either altogether wanting, or effuse, tartareous, rimoso-areolate, bluish-grey or greyish-white. Apothecia minute, numerous, irregularly scattered, semi-immersed, subhemispherico-globose, black; perithecium entire; ostiolum more or less depressed, at length perforated with a very minute pore; asci oblongo-clavate, 8 spored; spores broadly elliptical, bilocular, dark bright-brown; ·002 in. long, by ·001 in. broad.

Verrucaria gemmifera, Tayl. Fl. Hib. pt. 2. 95.—Leight. Brit. Angi. Lich. 47. pl. 20. fig. 3. Exs. 137!—*Endococcus gemmiferus,* Nyl. Syn. Pyren. 64 in pt.

On rocks and stones in mountainous districts, often occurring as a parasite on the thallus of *Lecanora atra,* and of *Lecidea confluens.* Haughmond Hill! Shropshire, *Rev. W. A. Leighton.* Near Cork! Ireland, *I. Carroll, Esq.* Common in the neighbourhood of Ayton, both as a parasite, and with a proper thallus of its own.

4. MICROTHELIA PYGMÆA, *Kbr.* Thallus none, or effuse, tartareous, rimuloso-areolate, subrugulose, greyish-white. Apothecia very minute, numerous, irregularly scattered, semi-immersed, globose, black; perithecium entire; ostiolum at length perforated with a simple pore; asci clavato-ventricose, 32 to 50 spored; spores elliptical, bilocular, bright-brown; ·001 in. long, by ·0005 in. broad.

Microthelia pygmæa, Kbr. S. L. G. 374.—*Verrucaria gemmifera,* var. Leight. Brit. Angi. Lich. 47. pl. 20. fig. 4.

On rocks and stones, often occurring as a parasite on the thallus of various crustaceous lichens. On *Aspicilia calcarea,* Head of Lough-na-Cat! Scotland, Sheep Walk! Armagh, Ireland, and on *Lecidea lapicida,* Braemar! *Admiral Jones.* On A. *calcarea,* var. *contorta,* and with a thallus of its own, near Battersby! Cleveland. Closely resembling the preceding species in its general appearance, but differs in the number of spores in each ascus, and by being smaller in size.

5. MICROTHELIA VENTOSICOLA, *Mudd.* Thallus none. Apothecia parasitic on the thallus of *Hæmatomma ventosum,* minute, numerous, irregularly scattered, semi-immersed in minute elevated thallodal verrucæ, globose, black; perithecium entire; nucleus dark-brown when dry, pale yellowish-brown when moist; paraphyses indistinct; asci obovato-clavate, 32 to 50 spored; spores elliptical or oblong, bilocular, pale brown or dark reddish-brown; ·0015 in. long, by ·0005 to ·00075 in. broad.

Sphæria ——, Kbr. S. L. G. 153.

Parasitic on the thallus of *Hæmatomma ventosum.* Kildale Moor! Cleveland. This species is distinguished from the preceding one, by its place of growth, and by the size of its apothecia and spores. Koerber apparently regards it as a *fungus*, but I think its claim to a place among the lichens, is equally as strong as any other species in the present genus, and if one is to be excluded, the whole of them ought to be; indeed it is by no means a settled question with me, whether the majority of the parasites now classed as lichens, ought to remain, or be removed at once and classed as *fungi*.

6. Microthelia rimosicola, (*Leight.*) Thallus none. Apothecia parasitic on the thallus of *Diplotomma calcareum*, minute, irregularly scattered over the alien thallus, semi-immersed, subhemispherical, black, slightly polished; ostiolum eventually slightly depressed and perforated with a very minute pore; nucleus pale; paraphyses indistinct; asci clavato-subventricose, 8 spored; spores sublinear-oblong or oblong, quadrilocular, eventually slightly constricted opposite the dissepiments, pale brown; ·0035 to ·004 in. long, by ·00125 to ·0015 in. broad. Plate 5. *fig.* 129.

Verrucaria rimosicola,, Leight. Exs. 253!

Parasitic on the thallus of *Diplotomma calcareum*. Wreckin Hill! Shropshire, *Rev. W. A. Leighton*. Ben Lawers! *Admiral Jones*. Penhill! Yorkshire, *J. G. Baker, Esq.* Carlton Bank! Cleveland. The specimens issued by *Leighton* in his Lich. Exs. as *Lecidea rimosa*, (Exs. 218.) belong to *Placodium candicans*, and those as *Verrucaria rimosicola*, parasitic on the thallus of *L. rimosa*, (Exs. 253.) to the present species, and to *Diplotomma calcareum*. The spores alone of each, if examined, will rectify the errors, as their internal organization is different in each species. In *Placodium* the spores are bilocular, in *Diplotomma* muriform-multilocular, and in the parasitic *Microthelia* they are quadrilocular.

7. Microthelia peripherica, (*Tayl.*) Thallus somewhat effuse, spreading from a centre, suborbicular, thickish, tartareous, rimoso-areolate, pruinose, white. Apothecia of a medium size, sparingly scattered, usually most numerous about the periphery, semi-immersed, globose, black; perithecium entire; ostiolum papillate, at length perforated with a simple pore; nucleus pale; paraphyses subdistinct, capillary, eventually diffluent; asci elongato-cylindrical, 8 spored; spores obtusely fusiform, quadrilocular, slightly constricted in the middle, dark bright-brown; ·0035 to ·004 in. long, by ·00125 to ·0015 in. broad.

Verrucaria peripherica, Tayl. Fl. Hib. pt. 2. 97.—Leight. Brit. Angi. Lich. 48. pl. 21. fig. 2.

On rocks in alpine districts. Carig Mountain! *Dr. Taylor*. Barmouth! North Wales, *Rev. T. Salwey*. I have described this plant as it appeared to me, but I greatly doubt whether the thallus really belongs to it, or to some *Lecidea*. Its apothecia also partake largely, both in their external appearance and internal structure, of the characters of those of some *Sphæria*. I leave it here for the present in uncertainty.

Genus 8. Strigula, (*Fries.*)

Apothecia solitary, subinnate, subhemispherical, at length depressed;

perithecium dimidiate; ostiolum at length irregularly fissured, or perforated with a minute simple pore; nucleus gelatinous when moist, indurated when dry; paraphyses indistinct; asci 8 spored; spores subcymbiform, quadrilocular, uncoloured. Thallus filmy, maculæform; parasitic on coriaceous perennial leaves.

1. STRIGULA BABINGTONII, *Berk.* Thallus very thin, filmy, mostly produced beneath the cuticle of the leaves on which it occurs, indicated externally by a greyish colouration. Apothecia minute, scattered, subhemispherical, depressed, dark-brown or nearly black; asci 8 spored; spores subcymbiform, quadrilocular, hyaline; ·0035 to ·004 in. long, by .001 in. broad. PLATE 5. *fig.* 130.

Strigula Babingtonii, Berk. E. Bot. Suppl. 2957.—Leight. Brit. Angi. Lich. 70. pl. 30. fig. 4. Exs. 35!—Nyl. Syn. Pyren. 68.

On laurel leaves. Gopsall! Leicestershire, *Rev. A. Bloxam.* Rokeby! Durham. The peculiar place of growth will always render this species easy of recognition.

ALPHABETICAL INDEX

TO

THE GENERIC AND SPECIFIC NAMES.

The names printed in Italics are synonyms; those in Roman Capitals are the Genera.

PAGE.
ABROTHALLUS ... 224
Bertianus, Massal ... "
Buellianus, Massal ... "
oxysporus, Tul. ... 225
Smithii, Tul. ... 224
  ater, Linds. ... "
  pulverulentus, Linds "
Welwitzschii, Tul. ... "
ACAROSPORA ... 158
cervina, Pers. ... "
  Heppii, Naeg ... 160
  microsticta, Leight 159
  percæna, Ach. ... "
  privigna, Ach. ... 160
  rufescens, Borr. ... 159
  simplex, Dav. ... 160
  sinopica, Wahlb. "
  smaragdula, Ach. 159
  squamulosa, Schrad. ... 158
ACOLIUM ... 253
stigonellum, Ach. ... 254
tigillare, Ach. ... "
tympanellum, Ach. ... "
ACROCORDIA
conoidea, Kbr. ... 297
gemmata, Kbr. ... "
ALECTORIA ... 69
bicolor, Ehrh. ... 70
jubata, L. ... "
  chalybeiformis, L. "
ochroleuca, Ehrh. ... "
sarmentosa, Ach. ... "
thrausta, Ach. ... 73
vulpina, L. ... 71
AMPHILOMA ... 126
callopisma, Kbr. ... 133
candicans, Kbr. ... "
elegans, Kbr. ... 131
hypnorum, Hepp ... 124
lanuginosa, Ach. ... 126
murorum, Kbr. ... 132
plumbea, Hepp ... 122
  myriocarpa, Hepp. "
ARTHONIA ... 245
aspersa, Leight ... 248
astroidea, Ach. ... 246
  anastomosans, Ach. "
  epipasta, Nyl. ... 247
  Swartziana, Ach. ... 246
dispersa, Duf. ... 252
epipasta, Ach. ... 247
glaucomaria, Leight. ... 251
gregaria, Weig. ... 249
  astroideum, Leight. 250
  cinnabarinum, T. and B. ... 249
  concolor, T. & B. .. "

PAGE.
  detritum, T. & B. 249
  marginatum, T. and B. ... "
  microstigma, T. and B. ... 250
  rosaceum, T. & B. 249
impolita, Ehrh. ... 248
ilicina, Tayl. ... "
lurida, Ach. ... 250
  spadicea, Leight... "
parasemoides, Nyl. ... 251
pruinosa, Massal. ... 249
punctella, Nyl. ... 252
punctiformis, Ach. ... 247
  galactina, Ach. ... 248
  olivacea, Ach. ... 247
trachylioides, Nyl. ... 251
vinosa, Leight. ... 250
ARTHOPYRENIA ... 299
analepta, Massal... 304
Betula, Massal. ... "
epipolæa, Massal. ... 297
epidermidis, Ach. ... 303
  acerini, Hepp ... 304
  analepta, Ach. ... "
  atomaria, Ach. ... 305
  cinerea, Pers. ... 304
  cinerio-pruinosa, Schær. ... 305
  coryli, Hepp. ... 304
  fallax, Nyl. ... 303
  galactites, DC. ... 305
  lactea, Ach. ... 304
  mespyli, Massal... "
  punctiformis, Pers "
fraxinea, Massal. ... "
fumago, Walbr. ... 302
gemmata, Massal. ... 297
linearis, Leight. ... 300
lucens, Tayl. ... 299
macularis, Wallr. ... 300
  codonoidea, Leight 301
  fusiformis, Leight. "
  trachona, Tayl. .. "
nitescens, Salw. ... 303
olivacea, Borr. ... 301
oxyspora, Nyl. ... 306
rhyponta, Ach. ... 303
Taylori, Carroll ... 302
umbrosa, Tayl. ... 300
ARTHOTHELIUM ... 252
dispersum, Duf. ... "
ASPICILIA ... 161
athrocarpa, Ach... 164
calcarea, L. ... 161
  contorta, Flk. ... 162
cinerea, L. ... "
  aquatica, Fries ... 163

PAGE.
  cinereo-rufescens, Ach ... 163
  ocellata, Flk. ... "
epulotica, Ach. ... 161
  punctata, Dicks. .. "
gibbosa, Ach. ... 162
pelobotrya, Wahlb. ... 164
polygonia, Massal. ... 163
scutellaris, Massal. .. "
verrucosa, Ach. ... 164
AULACOGRAPHA ... 242
elegans, Sm. ... "
BACIDIA ... 181
abstrusa, Kbr. ... 167
atrogrisea, Delise. ... 183
carneola, Ach. ... 182
incompta, Borr. ... 184
  atrosanguinea, Schær. ... "
luteola, Ach. ... 183
  cæsio-pruinosa, Mudd. ... "
  fuscella, Fr. ... "
  inundata, Fr. ... "
muscorum, Swartz. ... 184
pulvinata, Tayl. ... "
rosella, Pers. ... 181
rubella, Ehrh. ... 182
BAGLIETTOA
limboroides, Massal. ... 293
BIATORA
alba, Hepp ... 201
anomala, Fr. ... 187
anomala, Hepp ... 176
aromatica, Hepp ... 174
atropurpurea, Hepp ... 178
atrorufa, Fr. ... 172
aurantiaca, Fr. ... 137
  erythrella, Leight. 138
  flavovirescens, Leight. ... 194
  salicina, Leight.... 137
Byssoides, Fr. ... 63
candida, Hepp ... 172
carneola, Fr. ... 182
conglomerata, Massal... 194
commutata, Massal. ... 179
corallinoides, Hepp ... 175
coronata, Leight... 124
decipiens, Fr. ... 171
decolorans, Fr. ... 197
  flexuosa, Fr... "
denigrata, Fr. ... 151-179
dolosa, Hepp. ... 187
effusa, Massal. ... 195
Ehrhartiana, Kbr. ... 177
enteroleuca, Hepp. ... 200
  rugulosa, Hepp ... 200

PAGE.
epulotica, Hepp.... ... 161
æruginosa, Hepp.. ... 64
erysibe, Fr.... 141
glebulosa, Leight.. ... 154
globifera, Fr. 171
goniophila, Hepp.. ... 202
granulosa, Massal. ... 197
holomelena, Hepp. ... 178
icmadophila, Fr... ... 64
immersa, Hepp 203
incompta, Hepp... ... 184
lucida, Fr. 193
lurida, Fr. 170
luteola, Fr.... 183
  fuscella, Fr... ... 183
minuta, Kbr. 195
mixta, Fr. 176
multipunctata, Hepp... 206
muscorum, Leight. ... 187
ochracea, Hepp 202
ochromela, Hepp. 211
olivacea, Hepp 200
pachycarpa, Hepp ... 189
pezizoidea, Hepp... ... 185
phæostigma, Hepp ... 191
placophylla, Fr. 63
polytropa, Leight. ... 151
  conglobata, Fw. ... 152
  intricata, Kbr. ... ,,
  livida, Kbr... ... ,,
prasina, Hepp 196
premnea, Leight... ... 184
quernea, Fr... 193
Regeliana, Hepp... ... 189
rivulosa, Fr... 199
  Kochiana, Fr. ... ,,
rosella, Fr. 182
rubella, Hepp ... ... ,,
sabuletorum, Hepp ... 202
  aequata, Hepp ... ,,
  coniops, Hepp ... ,,
sphæroides, Kbr.. ... 187
synothea, Hepp 179
Taylori, Salw. 199
turgidula, Hepp... ... 201
uliginosa, Fr. 198
  fuliginea, Fr. ... ,,
umbonata, Hepp... ... 204
variegata, Hepp... ... 206
vernalis, Leight... ... 182
  atrofusca, Fw. ... 198
  conglomerata, Fr... 194
  pineti, Fr. 176
  sanguineoatra, Fr. 198
vesicularis, Hepp.. ... 173
viridescens, Kbr... ... 196
  putrida, Kbr. ... ,,
viridiatra, Fr. 206
BIATORELLA.. 191
immersa, Massal... ... ,,
  atrosanguinea, Massal. ... ... ,,
  pruinosa, Massal.. ,,
Morio, Ram. 192
  cinerea, Schær. ... ,,
pruinosa, Sm. 190
resinæ, Fr. ... ... ,,
  rubicundula, Mudd ,,
testudinea, Massal. ... 192

PAGE.
BIATORINA 175
atropurpurea, Schær... 178
chalybeia, Borr. 180
concreta, Wahlb... ... 181
Ehrhartiana, Ach. ... 176
Griffithii, Sm. 176
grossa, Pers 181
holomelæna, Hepp ... 178
Lightfootii, Sm.... ... 179
  commutata, Ach... ,,
melastigma, Tayl. ... 180
Muddii, Salw. 178
pineti, Schrad. 176
pulverea, Borr. 180
pyracea, Ach. 178
synothea, Ach. 179
BILIMBIA 187
anomala ... ... ,,
erysibe, Kbr. 141
fusca, Massal. 187
hexamera, Massal. ... ,,
milliaria, Fr. 188
  lignaria, Ach. ... ,,
  melæna, Nyl. ... ,,
  saxatilis, Fr. ... ,,
  terrestris, Fr. ... ,,
sabulosa, Massal. ... ,,
sphæroides, Sommf. ... 187
  dolosa, Ach. ... ,,
  lignicola, Kbr. ... ,,
Templetoni, Tayl. ... 189
tetramera, Massal. ... 187
BÆOMYCES... 63
anomalus, Tayl.... ... 199
Byssoides, L. 63
icmadophilus, Nyl. ... 64
placophyllus, Ach. ... 63
roseus, Pers ... ... ,,
rufus, Wahlb. ... ... ,,
BOMBYLIOSPORA 189
pachycarpa. Duf. ... ,,
BORRERA 103
astroidea, Fr. 108
  Clementi, Turn.... 109
Atlantica, Ach.... ... 104
aquila, Ach. 111
cæsia, Hoffm. 107
  albinea, Ach. ... 108
  tribacea, Ach. ... 107
chrysophthalma, Ach... 112
ciliaris, L. 105
  saxicola, Nyl. ... ,,
flavicans, Ach. 112
furfuracea, Ach. ... 72
hispida, Dill. 106
  tenella, Scop. ... ,,
intricata, Desf. 104
isidioides, Borr. 106
leucomela, L. 104
obscura, Ehrh. 109
  adglutinata, Flk. 110
  chloantha, Ach. ... ,,
  ulothrix, Fr. ... ,,
  virella, Ach. ... ,,
pulverulenta, Schreb ... ,,
  augustata, Hoffm. ,,
  grisea, Lam. ... 111
speciosa, Wulff. 107
stellaris, L.... 109

PAGE.
BRYOPOGON
jubatum, Kbr. 70
ochroleuca, Kbr.... ... 71
sarmentosum, Kbr. ... 70
BUELLIA 214
atrata, Sm. 215
badioatra, Flk. 214
  atro-albella, Nyl. ,,
coracina, Hoffm. ... ,,
disciformis, Fr. 216
  rugulosa, Ach. ... 217
  saprophila, Ach ... ,,
  tersa, Kbr. 216
major, Massal. 217
myriocarpa, DC... ... ,,
  punctiformis, Hoffm. ,,
nigritula, Nyl. ... ... ,,
saxatilis, Schær.... ... 216
Schæreri, Massal. ... 218
stellulata, Tayl.... ... 216
verruculosa, Borr. ... 215
  spurea, Schær. ... ,,
CALICIUM... 256
brunneolum, Ach. ... 260
cantharellum, Ach. ... 263
chlorellum, Wahlb. ... 262
chrysocephalum, Ach.... 261
clavellum, Hook. ... 257
curtum, T. & B.... ... ,,
  populneum, Hook. ,,
debile Hook. 259
eusporum, Nyl. 256
ferrugineum, T. & B. 260
furfuraceum, Pers ... 262
hyperellum, Ach. ... 258
inquinans, Schær. ... 254
  sessile. Schær. ... 255
lenticulare, Fr. 257
melanophæum, Ach. ... 259
microcephalum, Turn. 255
æruginosum, Sm. ... 259
pallidum, Pers 263
peronellum, Hook. ... ,,
phæocephalum, T. & B. 261
populneum, De Brond. 257
quercinum, Pers... ... ,,
saxatile, Schær. 216
sessile, Hook. 255
sphærocephalum, Hook. 258
stemoneum, Ach.... ... 260
stigonellum, Salw. ... 224
stigonellum, Ach. ... 255
subtile, Pers. 258
tigillare, Ach. 254
trachelinum, Ach. ... 258
trichiale, Ach. 259
turbinatum, Pers. ... 255
tympanellum, Ach. ... 254
CALLOPISMA 134
arenarium, Pers.... ... 138
aurantiacum, Ach. ... 137
  flavovirescens, Hoffm. ... ... ,,
  inalpinum, Schl.... ,,
  rubescens, Schær. 138
  salicinum, Schrad. 137
cerinum, Hedw.... ... 135
  chlorinum, Fw. ... 136
  stillicidiorum, Oed. ,,

PAGE.
- *chalybeum*, Kbr.... ... 134
- *citrinum*, Kbr. 132
- ferrugineum, Huds. ... 139
  - festiva, Ach .. ... ,,
- Lallavei, Clem. ... ... ,,
- luteoalbum, Turn. .. 136
  - holocarpum, Ehrh. 137
- ochraceum, Schær. ... 138
- vitellinum, Ehrh... ... 135
- vitellinellum, Mudd ... ,,

CATILLARIA
- *chalybeia*, Massal. ... 180
- *concreta*, Massal.. ... 181
- *lutosa*, Massal. 202
- *premnea*, Kbr. 181

CETRARIA 78
- *aculeata*, Fr. 77
- cucullata, Bell. 78
- glauca, L. 79
  - fallax, Weber. ... ,,
- *islandica*, Ach. 77
- juniperina, L. 79
  - pinastri, Scop. ... ,,
- nivalis, L. 78
- sepincola, Ehrh 80
- *tristis*, Fr. 76

CHIODECTON 245
- *graphidioides*, Leight.. ,,
- myrticola, Fee. ... .. ,,
  - albidum, Tayl .. ,,
  - sarniensis, Salw... ,,

CHIOGRAPHA
- *Lyellii*, Leight. 241

CHLOREA
- *vulpina*, Nyl. 71

CLADONIA 52
- *bellidiflora*, Fr. 60
- *carneola*, Fr.. 56
- *ceranoides*, Schær. ... 57
- coccifera, L 60
  - bellidiflora, Ach... ,,
  - cornucopioides, L. ,,
  - corymbiformis, Flk 62
  - deformis, ... 61
  - digitata, Hoffm... ,,
  - digitato-radiata, Schær. ... ... ,,
  - extensa, Hoffm... 60
  - Florkeana, Fr. ... 61
  - filiformis, Relh. ... 62
  - macilenta, Ehrh... 61
  - obtusa, Schær. ... 62
  - pleurota, Flk. ... 60
  - polydactyla, Flk... 62
  - rubiformis, Sm. ... ,,
  - subulata, Schær.... 61
  - tubæformis, Kbr... ,,
- *crenulata*, Flk. ... ... ,,
- endiviæfolia, Fr 52
  - alcicornis, Lightf. . ,,
- gracilis, L. 54
  - anomæa, Sm. ... 55
  - cariosa, Flk. . ... ,,
  - cervicornis, Ach. . 54
  - chordalis, Schær. . 55
  - degenerans, Flk... ,,
  - euphorea, Flk. ... ,,
  - haplotea, Flk. ... ,,
  - hybrida, Fr... ... ,,
  - phyllophora, Ehrh. 55
  - simplex, Schær. ... ,,
  - verticillata, Hoffm 54
- furcata, Huds. 57
  - crispata, Ach. ... 57
  - decumbens, Mudd 58
  - erecta, Fw... ... ,,
  - pungens, Sm. ... ,,
  - racemosa, Hoffm . 57
  - recurva, Hoffm. ... 58
  - subuluta, L... .. ,,
- *pallida*, Schær. 56
- Papillaria, Ehrh... ... 59
- pyxidata, L... 53
  - carpophora, Flk... 54
  - cornuta, Flk. ... 53
  - dendroides, Flk... ,,
  - denticulata, Flk... 54
  - epiphylla, Schær... 53
  - fimbriata, L.. ... ,,
  - macra, Flk... ... 54
  - marginalis, Schær. 53
  - neglecta, Flk. ... 54
  - pocillum, Ach. ... 53
  - prolifera, Schær... ,,
  - radiata, Schær. ... ,,
  - simplex, Schær. ... ,,
  - subuluta, Schær... ,,
  - tuberculosus, Schær ,,
  - tubæformis, Kbr.. 54
- rangiferina, L. 58
  - alpestris, L... ... 59
  - sylvatica, L... ... ,,
- squamosa, Hoffm. ... 56
  - attenuata, Fr. ... ,,
  - cæspititia, Ach. ... 57
  - decorticata, Flk... 56
  - delicata, Ehrh. ... ,,
  - leptophylla, Ach. . 57
  - microphylla, Schær 56
  - prolifera, Schær... ,,
  - simpliuscula, Schær ,,
  - ventricosa, Fr. ... ,,
- uncialis, L. 59
  - elatior, Fr. ... ... ,,
  - humilior, Fr . ... ,,
  - turgescens, Fr. ... 68
- *vermicularis*, Hook ... 68

CLIOSTOMUM ... ...
- *corrugatum*, Fr. 177

COCCOCARPIA ... ...
- *plumbea*, Nyl. 122

COLLEMA, ... 36
- *aggregatum*, Nyl. ... 43
- *atro-cœruleum*, Schær... 47
- *Burgessii*, Ach. 45
- ceranodes, Borr.... ... 41
- chelium, Ach. 40
- *chloromelum*, Ach. ... 49
- *conglomeratum*, Hoffm. 43
- *cretaceum*, Ach. 46
- crispum, Borr. 40
- *crispum*, Nyl. 39
- *cristatum*, Hook... ... 38
- *cyanescens*, Schær. ... 48
- dermatinum. Borr. ... 36
- epiphyllum, Leight. ... 41
- *fasciculare*, Hook. ... 43
  - *aggregatum*, Ach. ,,

PAGE.
- flaccidum, Ach. 42
- fluviatile, Huds.... ... 40
- fragile, Tayl. 37
- *fragrans*, Hook 46
- furvum, Ach. 36
- *granulatum*, Hook ... ,,
- *glomerulosum*, Tayl. ... 51
- *lacerum*, Ach. 47
- *marginale*, Hook. ... 37
- melænum, Ach. ... ... ,,
  - jacobæifolium, Schrank.... ... ,,
  - marginale, Huds. ,,
- microphyllum, Ach. ... 41
- *multifidum*, Schær. ... 37
- *multiflorum*, Hepp. ... 39
- *multipartitum*, Sm. ... 43
  - *complicatum*, Schær. 44
- *muscicola*, Ach. 50
- *nigrum*, Ach. 175
- *nigrescens*, Ach.... ... 42
  - *vespertilio*, Schær ,,
- *palmatum*, Ach. ... 48
- plicatile, Ach. 38
- *pubescens*, Schær. ... 34
- pulposum, Bernh. ... 38
  - cristatum, Borr.... 39
  - granulatum, Sw. 38
  - limosum, Ach. ... 39
- *ruginosum*, Schær. ... 49
- *saturninum*, Ach. ... 45
- *Schraderi* Ach. 50
- *scotinum*. Ach. 47
- *sinuatum*, Hook. .... ,,
- *spongiosa*, Hook. ... 86
- *stygium*, Schær. 35
  - *incisum*, Schær. ... ,,
- *subtile*, Hook. 47
- *synalissum*, Ach. ... 35
- *symphoreum*, DC. ... ,,
- tenax, Swartz. 39
- *tennuissimum*, Hook. ... 46
- tunæforme, Ach. ... 36
- turgidum, Ach.... .. 38
- *tremelloides*, Ach. ... 48

CONIANGIUM, ...
- *luridum*, Kbr. 251
- *vulgare*, Fr. ... ... ,,

CONIOCARPON ... ...
- *cinnabarinum*, Fr. ... 249
- *gregarium*, Schær. ... ,,

CONIOCYBE 262
- *citrina*, Leight. 261
- furfuracea, L. 262
  - fulva, L. ... ... ,,
  - sulphurella, Wahlb. ,,
- pallida, Pers. ... ... ,,
- *stilbea*, Kbr. 263

CORNICULARIA 76
- aculeata, Ehrh. 77
  - *campestris*, Ach.... ,,
  - cælocaula, Fw, ... ,,
- *flavicans*, Schær. ... 112
- islandica, L. 77
  - crispa, Ach... ... ,,
- *jubata*, Schær, ... 70
- *lanata*, Ach. 101
- *ochroleuca*, Ach.... ... 71
- *pubescens*, Ach. 34

PAGE.
tristis, Weber. 76
vulpina, Schær. 71
CYPHELIUM 259
chlorellum, Wahlb. ... 262
chrysocephalum, Turn. 261
citrinum, Leight. ... ,,
melanophæum, Ach. ... 259
phæocephalum, T. & B. 261
trichiale, Ach. 259
    brunneolum Ach. 260
    ferrugineum, T. & B. ,,
    stemoneum, Ach. ,,
DACTYLOSPORA 223
Florkei, Kbr. 224
inspersa, Tul. ... ... ,,
DECAMPIA... 270
Hookeri, Borr. ... ... ,,
DERMATOCARPON ... 269
Garovaglii, Montagn... 270
isidioides, Borr. ... .. ,,
pallidum, Ach. 269
Schæreri, Kbr. ... 270
DIPLOICIA 168
canescens, Dicks... ... 169
DIPLOTOMMA. 218
alboatrum, Hoffm. ... ,,
    epipolium, Ach... ,,
    populorum, Massal ,,
    trabinellum, Fw ,,
calcareum, Weis... ... 219
Weisii, Massal. ... ... ,,
ENDOCARPON 265
cinerum, Pers. 268
fissum, Leight. 281
fluviatile, DC 266
    euplocum, Ach. . ,,
fuscellum, Hook.. ... 288
Garovaglii, Schær. ... 270
Hedwigii, Hook... .. 268
    lachneum, Hook . 267
    squamulosum,
        Hook. ... ... ,,
hepaticum, Ach 268
isidioides, Leight. ... 270
lachneum, Ach. 267
lithinum, Leight.. ... 281
lætevirens, Hook.. .. 269
macrocarpon, Tayl. .. 290
microsticticum, Leight. 159
miniatum, L. .. . 265
    aquaticum, Hook. 266
    complicatum, Sw.. 265
    leptophyllum, Ach. 266
pallidum. Ach. 269
parasiticum, Ach. ... 224
polystictum, Hook. .. 288
psoromoides, Borr. ... 267
pusillum, Hedw.. ... 268
pulchellum, Hook. 269
rufescens, Ach. 267
rufovirescens, Tayl. .. 159
smaragdulum, Ach. .. ,,
    privigna, Leight... 160
sinopicum, Wahlb. ... ,,
sorediatum, Hook. .. 270
tephroides, Ach... ... 268
viride. Ach... 269
viridulum, Schrad. .. 289
EPHEBE. 34

PAGE.
pubescens, Fr. .. .. ,,
EVERNIA 71
flavicans, Fr. 112
furfuracea, L. 71
jubata, Fr. 70
ochroleuca, Fr. 71
prunastri, L.. 72
    stictocera, Sm. ... ,,
vulpina, Kbr. 71
FUCUS
pygmæus, Sm. 33
GRAPHIS
dendritica, Ach 241
    obtusa, Leight. .. ,,
diffracta, Leight.. 240
    flexuosa, Leight . ,,
    major, Leight. ... ,,
    minor, Leight. ... ,,
    radiata, Leight. ... ,,
elegans, Ach. 242
inusta, Ach.. 240
    divaricata, Leight.. 241
    elongata, Leight .. ,,
    macularis, Leight. ,,
    simpliuscula,
        Leight. ... .. ,,
    vera, Leight. ... ,,
Lyellii, Sm.. ... ... ,,
pulverulenta, Leight... 236
scripta, Leight. ... ... ,,
scripta, L. 237
    abietina, Schær. ... ,,
    diffracta, Turn. . 240
    divaricata, Leight. 238
    eutypa, Ach. ... 239
    flexuosa, Leight... 238
    fraxinea, Nyl. ... 239
    horizontalis, Leight 238
    minuta, Leight. ... 237
    radiata, Leight. ... 238
    recta, Humb. ... 239
    spathea, Ach. ... ,,
    stellata, Leight. ... ,,
    tremulans, Leight. ,,
    varia, Leight. ... 238
serpentina, Ach... ... 237
Smithii, Leight... ... 241
GYALECTA 166
Acharii, Schær. 160
cupularis, Ehrh... ... 166
epulotica, Ach. 161
exanthematica, Fr. ... 279
foveolaris, Ach. 167
pineti, Leight. 176
rubra, Massal. 166
truncigena, Ach.. ... 167
Wahlenbergiana, Ach. ,,
GYROPHORA 115
cylindrica, L. 118
    denticulata, Ach... 119
    denudata, Turn. ... ,,
    exasperata, Turn. ,,
deusta, Ach... 116
erosa, Weber. 117
grisea, Sw. 120
hyperborea, Ach. ... 117
    arctica, Ach. ... ,,
murina, Ach. 120
pellita. Ach. ... ... ,,

PAGE.
polyphylla, L. 116
    floculosa, Wulf. .. ,,
    lacera, Leight. ... ,,
polyrrhizos, L. 119
proboscidea, Ach. ... 118
    corrugata, Hoffm. ,,
    exasperata, Ach.... ,,
    fimbriata, Turn.... ,,
    mesenteriformis,
        Wulf. ... ... ,,
vellea, L. 120
HÆMATOMMA 157
coccineum, Dicks. ... ,,
ventosum, L. ... ... ,,
vulgare, Massal.... ... 158
HYMENODECTON ... ...
dendriticum, Leight. ... 241
    obtusa, Leight. ... ,,
ICMADOPHILA 64
aeruginosa, Scop. ... ,,
ISIDIUM
coccodes, Ach, ... 274
corallinum, Ach. ... 273
lutescens, Hook. 276
microsticticum, Hook. 272
oculatum, Ach. 157
paradoxum, T. & B. ... 273
LECANACTIS
abietina, Kbr. 223
Dilleniana, Kbr... ... ,,
illecebrosa, Kbr.... ... 222
lyncea, Eschw. 229
LECANIA 140
carneolutea, Turn. ... ,,
cœrulescens, Mudd. ... ,,
    cœruleo-rubella.
        Mudd. 141
erysibe, Ach. ... ... ,,
    aipospila, Borr. ... ,,
    cinereo-fusca, Mudd. ,,
    Rabenhorstii, Hepp. ,,
fuscella, Schær. 140
LECANORA 144
adglutinata, Flk. ... 110
aipospila, Borr. 141
albella, Pers. 147
    angulosa, Ach. ... 148
    crenulata, Dicks... ,,
    Hageni, Ach. ... ,,
alboflavida, Tayl. ... 154
aquatica, Hepp.... ... 163
aspersa, Borr. 162
atra, Huds.... 145
    verrucoso-areolata,
        Schær. 282
aurantiaca, Nyl. ... 137
badia, Pers. 144
brunnea, Ach. 124
    coronata, Ach. ... ,,
callopisma, Ach.... ... 133
candelaria, Ach... ... 114
candicans, Schær. ... 133
carneolutea, Ach. ... 140
cartilaginea, Hepp. ... 128
cæsiorufa, Hook. ... 139
cerina, Ach. 136
cervina, Schær. ... ... ,,
    castanea, Schær.... 158
    percæna, Schær.... 159

PAGE.
  rufescens, Schær. ,,
  simplex, Nyl. ... 160
  sinopicum, Schær. ,,
  smaragdula, Schær. 159
chalybæa, Schær. ... 134
chloroleuca, Ach. ... 136
cinerea, Nyl. 163
  calcarea, Nyl. ... 162
  cinereo-rufescens, Nyl.... 163
circinata, Ach. 130
citrina, Ach. 132
coarctata, Ach. 154
  elacista, Ach. ... ,,
  glebulosa, Sm. ... ,,
  involuta, Tayl. ... ,,
  ornata, Sommf. ... ,,
coracina, Hepp. 205
crassa, Ach. 127
  cæspitosa, Schær... ,,
exigua, Hook. 142
friabilis, Schær. 131
fulgens, Ach. ... ...
fuscoluteolina, Mudd ... 153
frustulosa, Dicks... ... 145
galactina, Ach. 149
  disperso-areolata, Schær. ... ... ,,
gelida, Ach. 129
glaucoma, Ach 153
  subcarnea, Ach. ... ,,
Hæmatomma, Ach. .. 158
hypnorum, Ach. 124
Lallavei, Nyl. 139
lentigera, Ach. 128
leucolepis, Ach. 125
limbata, Sommf.. ... 86
lobulata, Flk. 113
metabolica, Ach 143
milvina, Wahlb... ... 144
miniata, Ach. 132
muralis, Schær. 129
murorum, Schær... ... 132
  lobulatum, Schær.. ,,
ocellata, Hepp 163
ochracea, Nyl. 138
oculata, Dicks. 156
pallescens, L. 155
  alboflavescens, Schær. ... ... ,,
  parella, L. ... ... ,,
  tumidula, Pers. ... ,,
  Turneri, Sm.. ... ,,
Upsaliensis, Schær. ... 156
pallida, Schær. 148
  albella, Schær. ... ,,
  angulosa, Schær... ,,
  fuscella, Schær. ... 140
periclea, Hook. 143
pezizoides, Borr. 124
polytropa, Ehrh... ... 151
  acrustacea, Schær ,,
  alpigena, Ach. ... 152
  campestris, Schær- 151
  conglobata, Flot... 152
  intricata, Schrad... ,,
radiosa, Schær. 130
rimosa, Schær. 153
  subcarnea, Schær.. ,,

PAGE.
rubra, Ach... 166
rubricosa, Ach. 139
salicina, Ach. 137
saxicola, Ach. 129
sophodes, Ach. 142
squamulosa, Hook. ... 158
subfusca, L... 146
  albella, Nyl... ... 148
  allophana, Kbr. ... 147
  atrynea, Ach. ... ,,
  bryontha, Kbr. ... ,,
  campestris, Schær. ,,
  crenulata, Schær... 149
  discolor, Fr... ... 146
  distans, Ach. ... ,,
  epibryon, Ach. ... 147
  glabrata, Ach. ... 146
  hypnorum, Schær. 147
  lainea, Ach... ... ,,
  leucopis, Schær. ... ,,
  pinastri, Schær. ... 146
  vulgaris, Schær. ... ,,
sulphurea, Hoffm. ... 152
tartarea, L... 156
  arborea, DC.. ... ,,
  frigidia, L. ... ... ,,
  Upsaliensis, Hook. ,,
thelostoma, Hook.. ... 293
tuberculosa, Hook. ... 162
umbrina, Massal. 148
varia, Ehrh... 149
  aitema, Ach.. ... 150
  denigrata, Fr. ... 151
  maculiformis, Schær. ... ... ,,
  orosthea, Sm. ... 150
  sarcopis, Wahlb... ,,
  symmicta, Ach. ... ,,
ventosa, Ach. 157
verrucosa, Hepp... ... 165
vitellina, Ach. 135
LECIDEA 192
æruginosa, Borr... ... 197
æruginosa, Schær. ... 64
abietina, Nyl. 223
aggregata, Mudd 208
aitema, Ach.. 150
albo-atra, Hook... ... 220
  epipolia, Schær. ... 219
  populneum, Nyl ... 218
  saxicola, Fr... ... 219
  trabinella, Fr. ... 218
albocœrulescens, Wulf. 121
  alpina, Schær. ... ,,
  flavocœrulescens, Ach. ... ... ,,
ambigua, Ach. 206
amphibia, Schær. 214
amylacea, Nyl. 222
anomala, Hook... ... 176
  effusa, Hook.. ... 195
  minuta, Schær. ... ,,
arctica, Sommf. 200
aromatica, Hook.. ... 174
atrata, Hook. 215
atro-alba, Hook... ... 220
  concentrica, Leight ,,
  lavata, Fr. ... ... ,,
  murina, Fr... ... 221

PAGE.
atro-alba, Fw. 214
  atro-albella, Nyl... ,,
atro-brunnea, Ram. ... 205
atro-cinerea, Hook. ... 144
atro-flava, Hook... .. 137
atro-fusca, Fw. 198
atro-grisea, Delise. ... 184
atro-sanguinea, Hoffm. 203
atrorufa, Schær.... .. 172
aurantiaca, Hook. ... 137
  pyracea, Ach. ... 178
badio-atra, Flk. 214
cæsio-rufa, Ach... .. 139
  festiva, Ach... ... ,,
calcarea, Hepp. 219
  Weisii, Schær. ... ,,
calcivora, Ehrh. 203
candida, Fr... 172
canescens, Ach. 169
carneola, Ach. 194
carneolutea, Nyl... .. 140
cechumena, Hook... ... 164
  athrocarpa, Hook. ,,
  testudinea, Ach. ... 192
cerebrina, Schær. 226
chalybeia, Borr. 180
citrinella, Ach. 186
  arenicola, Nyl. .. 187
coarctata, Nyl. 154
confervoides, Schær. ... 214
  areolata, Schær. ... 220
  atroalba, Schær. ... ,,
conglomerata, Hedy. ... 194
coniops, Wahlb. 201
  aequata, Flk.. ... 202
contigua, Fr.. 209
  confluens, Weber.. 210
  convexa, Fr. . ... ,,
  flavicunda, Nyl. ... 211
  ochromela, Ach ... ,,
  platycarpa, Ach... 210
  steriza, Flk.... ... ,,
coracina, Ach. 205
cornea, Hook. 182
  abstrusa, Schær. ... 167
coronata. Hook. 124
  eschraroides, Hook 123
crustulata, Ach. 209
  fuscella, Mudd .. ,,
cupularis, Nyl. 167
decipiens, Schær... ... 171
decolorans, Hoffm. ... 197
  escharoides, Ehrh. ,,
  viridula, Mudd. ... ,,
dispora, Hepp. 220
dubia, Hook.. 151
Dubyanoides, Hepp ... 217
effusa, Ach... 195
Ehrhartiana. Ach. ... 177
enterochlora. Leight. ... 207
erythrella, Hook. 138
erythrocarpia, Schær... 139
exanthematica, Nyl. ... 279
expallens, Hook... ... 150
expansa, Nyl. 208
ferruginea, Hook.. ... 139
flavovirescens, Hook. ... 186
flexuosa, Fr... 196
  aeruginosa, Borr... 197

PAGE.

- *foveolaris*, Nyl. 167
- fuliginosa, Tayl. 208
- fumosa, Hoffm. 211
  - deusta, Fr. ,,
  - grisella, Flk. 212
- furvella, Nyl. 207
- *fuscoatra*, Leight. 192
  - *deusta*, Fr. 212
- *fuscolutea*, Ach. 190
- *geographica*, Hook. 221
  - *alpicola*, Leight. ,,
  - *atrovirens*, Fr. ,,
  - *contigua*, Fr. ,,
  - *sphærica*, Schær. ,,
  - *urceolata*, Schær. ,,
- *geomæa*, Tayl. 188
- *glaucolepidea*, Nyl. 171
- *globifera*, Ach. ,,
- goniophila, Flk. 202
  - acervata, Mudd ,,
- *granulosa*, Schær. 197
- *Griffithii*, Hook 176
- *grossa*, Pers. 181
- *holomelæna*, Schær. 178
  - *vermifera*, Nyl. 185
- *Hookerii*, Schær. 271
- *icmadophila*, Ach. 64
- *incana*, Hook. 189
- *incompta*, Borr. 184
- *immersa*, Ach. 203
  - *pruinosa*, Schær. 191
  - *calcivora*, Schær. 203
- *irrubata*, Hook. 178
- *inspersa*, Tul. 224
- *insularis*, Nyl. 205
- *intricata*, Borr. 152
- intumescens, Flot. 205
- *lactea*, Schær. 206
- *lævigata*, Nyl. 199
- lapicida, Fr. 209
  - silacea, Ach. ,,
- *leucocephala*. Schær. 223
  - *denudata*, Schær. ,,
  - *lecidina*, Schær. ,,
- *leucoplaca*, Chev. 181
- *Lightfootii*, Ach. 179
  - *commutata*, Schær. ,,
- lucida, Ach. 193
- *lugubris*, Sommf. 213
- *lurida*, Schær. 170
- *lutea*, Borr. 177
- *luteola*, Ach. 183
  - *endoleuca*, Nyl. 184
  - *erysibe*, Ach. 141
  - *fuscella*, Nyl. 183
  - *incompta*, Nyl. ,,
  - *inundata*, Nyl. ,,
- *luteoalbum*, Schær. 137
- lutosa, Montagn. 202
- *mamillare*, Fr. 173
- *marmorea*, Hook. 167
- melanophæa, Fr. 206
- *melastigma*, Tayl. 180
- *micraspis*, Hepp. 217
- *microphylla*, Schær. 123
- *microspora*, Hepp. 218
- *milliaria*, Er. 188
  - *lignaria*, Fr. ,,
  - *rudeta*, Fr. ,,

PAGE.

  - *saxatilis*, Fr. 188
  - *terrestris*, Fr. ,,
- minuta, Schær. 195
- *Montagnei*, Flot. 220
- Mooreana, Carr. 207
- *Morio*, Fr. 192
  - *cinerea*, Schær. ,,
  - *coracina*, Schær. 215
- *Muddii*, Salw. 179
- mutabilis, Fee. 125
- *muscorum*, Hook. 195
- *myriocarpa*, DC. 217
- *nigritula*, Nyl. 218
- *nitidula*, Fr. 209
- obscurioides, Linds 212
- *ochracea*, Schær. 138
- ochrococca, Nyl. 194
- *Œderi*, Ach. 221
- *ostreata*, Schær. 169
- *pachycarpa*, Duf. 189
- parasema, Ach. 200
  - *disciformis*, Fr. 216
  - elœochroma, Ach. 200
  - enteroleuca, Ach. 201
  - *rugulosa*, Ach. 216
  - *saprophila*, Ach. ,,
  - saxicola, Leight. 201
- *parasitica*, Schær. 224
- *percæna*, Ach. 159
- *petræa*, Leight. 220
- *pezizoidea*, Ach. 190
- *picta*, Tayl. 138
- *pineti*, Ach. 176
- *pinicola*, Hook 217
- *polytropa*, Ach. 151
- prasina, Fr. 196
- *premnea*, Fr. 181
- *premnea*, Hook 184
- *privigna*, Ach. 160
- prominula, Borr. 203
- protrusa, Fr. 207
- *pruinosa*. Hook 191
- *pulverea*, Borr. 180
- *pulvinata*, Tayl. 185
- *punctata*, Schær 216
  - *parasema*, Schær. ,,
  - *punctiformis*, Schær. 217
- *punctiformis*, Hepp. 217
  - *fuliginosa*, Hepp. 217
  - *muscicola*. Hepp. 217
- *quadricolor*, Hook 197
- *quernea*, Ach. 193
- *resinæ*, Leight. 191
- *rimosa*, Leight. 133
- rivulosa, Ach. 199
  - Kochiana, Hepp. ,,
- *rubella*, Schær. 182
- *rufescens*, Borr. 159
- rupestris, Scop. 193
  - incrustans, D.C. 194
  - viridiflavescens, Wulff 194
- *rosella*, Hook 182
- *sabuletorum*, Schær. 188
  - *alpestris*, Fr. 185
  - *melæna*, Nyl. 188
  - *sabulosa*, Nyl. 189
- *terrestris*, Schær. 188
- *Salwesii*, Borr. 154
- *sanguinaria*, Ach. 213

PAGE.

- sanguineoatra, Fr. 198
- *saxatilis*, Hepp. 216
- *scabra*, Tayl. 207
- *simplex*, Hook. 160
- *sphæroides*, Sommf. 187
  - *albella*, Schær. 178
  - *atropurpurea*, Schær. ,,
  - *fusca*, Schær. 187
  - *muscorum*, Schær. ,,
  - *vernalis*, Schær. ,,
- *spirea*, Hook. 219
- *spurea*, Schær. 215
- *squamulosa*, Deak. 174
- *stellulata*, Tayl. 216
- *subcarnea*, Ach. 153
- *sublurida*, Nyl. 172
- *sulphurea*, Ach. 152
- *synothea*, Ach. 179
- Taylori, Salw. 199
- *Templetoni*, Tayl. 189
- tenebrosa, Flot 204
- *trachylioides*. Ach. 251
- *triptophylla*, Ach. 123
  - *corrallinoides*, Schær. 175
  - *pezizoides*, Schær. 124
- *truncigena*, Nyl. 167
- turgidula, Fr. 201
- uliginosa, Schrad. 197
  - fuliginea, Ach. 198
- *ulmicola*, Borr. 137
- umbonata, Hepp. 204
- *variegata*, Fr. 206
- *verruculosa*, Borr. 215
- *vesicularis*, Ach. 173
- viridescens. Schrad. 196
  - gelatinosa, Flk. ,,
- *viridiatra*, Hook. 210
- viridiatra, Stenh. 205
- *vernalis*, Hook. 182
  - *anomala*. Nyl. 188
- vitellinaria, Nyl. 212
- Wulfenii, Hepp. 200
- LECOTHECIUM 174
- *corallinoides*, Kbr. 175
- nigrum, Huds. ,,
  - fuscum, Hepp. ,,
- LENORMANDIA
- *jungermanniæ*, Delis, 269
- LEPRARIA
- *viridis*, Hook. 114
- LEPTOGIUM 45
- *Brebissoni*, Mont. 49
- *Burgessii*, Nyl. 45
- chloromelum, Sw. 48
- cretaceum, Sm. 45
- *cyanescens*, Kbr. 48
- *fragile*, Nyl. 38
- fragrans, Sm. 46
- lacerum, Sw. 47
  - pulvinatum, Hoffm ,,
- *muscicolum*, Nyl. 50
- palmatum, Huds. 48
- *saturninum*, Nyl. 45
- Schraderi, Bernh. 49
- *scotinum*, Nyl. 47
- sinuatum, Huds. ,,
- *spongiosum*, Nyl. 46
- subtile, Schrad. ,,

PAGE.
tenuissimum, Dicks. ,,
tremelloides, L. 48
LICHEN
abietinus, Ach. 223
Acharii, Sm. 161
Acetabulum, Neck. 99
acicularis, Sm. 262
acrotellus, Sm. 293
aculeatus, Ehrh. 77
affinis, Dicks. 122
agelæus, Ach. 280
amylaceus, Ehrh. 222
albellus, Pers. 148
albocærulescens, Wulf. 211
alcicornis, Lightf. 52
aleurites, Ach. 98
angulosus, Ach. 148
angustatus, Hoffm. 110
aphthosus, L. 82
aquaticus, Sm. 266
aquilus, Ach. 111
arenarius, Pers. 139
argenus, Ach. 280
aromaticus, Turn. 174
articulatus, L. 69
ater, Huds. 145
athrocarpus, Ach. 164
atlanticus, Sm. 104
atroalbus, Sm. 220
atrobrunneus, Ram. 205
atrocinereus, Dicks. 144
atroflavus, Sm. 137
atrorufus, Dicks. 172
auratus, Sm. 90
badius, Pers. 144
bellidiflorus, Ach. 60
bicolor, Ehrh. 70
Borreri, Sm. 94
brunneus, Sw. 124
Burgessii, Lightf. 45
Byssoides, L. 63
cæspititius, Sm. 57
cæsiorufus, Schrad. 139
cæsius, Hoffm. 107
calcareus, Weis. 219
calcareus, L. 162
calcivorus, Ehrh. 203
calvus, Dicks. 194
candelarius, L. 114
candicans, Dicks. 133
candidus, Sm. 223
candidus, Weber. 172
canescens, Dicks. 169
caninus, L. 82
caperatus, Dill. 101
capitatus, Schreb. 262
carnosus, Dicks. 126
carneoluteus, Turn. 140
carlilagineus, West. 128
cechumena, Sm. 211
cerinus, Hedw. 136
cervicornis, Ach. 51
cervinus, Pers. 158
ceuthocarpus, Sm. 270
chalybeiformis, L. 70
chloroleucus, Sm. 136
chloromelus, Sw. 49
chrysophthalmus, L. 112
ciliaris, L. 105

PAGE.
cinereofuscus, Weber. 139
cinereus, L. 163
circinatus, Pers. 130
citrinellus, Sm. 186
citrinus, Ach. 132
clavellus, Sm. 257
Clementi, Sm. 109
cæruleonigricans, Lightf. 173
coarctatus, Sm. 154
coccineus, Dicks. 157
cocciferus, L. 60
coccodes, Ach. 274
complicatus, Sw. 265
concentricus, Dav. 220
concolor, Dicks. 114
confluens, Weber. 219
conglomeratus, Hedy. 194
conspersus, Ehrh, 102
corallinus, L. 273
cornucopioides, L. 60
cornutus, Sm. 61
corrugatus, Sm. 99
corneus, Sm. 182
corticola, Sm. 218
crassus, Huds. 127
cretaceus, Sm. 46
crenulatus, Dicks. 149
crispus, Sm. 39
crocatus, L. 89
croceus, L. 85
cucullatus, Bell. 78
cycloselis, Ach. 109
cylindricus, L. 119
cyrtellus, Sm. 187
dealbatus, Ach. 273
debilis, Sm. 259
decipiens, Ehrh. 171
deformis, L. 61
diacapsis, Sm. 212
diaphorus, Ach. 231
diatrypus, Ach. 98
diffusus, Weber. 103
discoideus, Sm. 274
dubius, Sm. 150
effusus, Ach. 195
Ehrhartiana, Ach. 177
elegans, Link. 131
elæinus, Sm. 110
endivifolius, Dicks 52
ericetorum, Sm. 64
erosus, Web. 117
erythrellus, Ach. 138
escharoides, Ehrh. 197
escharoides, Sm. 123
exanthematicus, Sm. 279
exiguus, Ach. 142
fagineus, Sm 274
Fahlunensis, *L.* 100
fallax, Web. 80
farinaceus, *L.* 73
fascicularis, Sm. 43
fastigiatus, Ach. 73
ferrugineus, Huds. 139
fibrosus, Sm. 162
filiformis, Relh. 62
fimbriatus, L. 53
flaccidus, Ach. 42
flavicans, Sw. 112
flavoviresens, Dicks 186

PAGE.
floridus, L. 69
fluviatilis, Huds. 41
flocculosus, Wulf. 116
fragilis, L. 264
fragrans, Sm. 46
fraxineus, L. 73
frigidus, L. 156
frustulosus, Dicks. 145
fuciformis, L. 76
fulgens, Sw. 131
fuliginosus, Dicks. 88
furfuraceus, L. 72
furvus, Ach. 36
fuscellus, Turn. 288
fuscoluteus, Dicks. 190
gelidus, L. 129
geographicus, L. 221
gracilis, L. 54
glaucomus, Ach. 153
glaucus, L. 80
glebulosus, Sm. 154
globiferus, Sm. 264
globuliferus, Sm. 274
glomeratus, Schl. 277
glomuliferus, Lightf. 91
granulatus, Sm. 36
Griffithii, Sm. 176
griseus, Lam. 111
griseus, Sw. 120
Hæmatomma, Ehrh. 157
herbaceus, Huds. 91
hirtus, L. 69
hispidus, Dill. 106
Hoffmanni, Sm. 162
holocarpus, Ehrh. 137
Hookeri, Sm. 125
horizontalis, L. 84
hymenius, Sm. 276
hyperboreus, Ach. 117
hypnorum, Vahl. 124
incanus, Sm. 189
inclusus, Sm. 278
immersus, Sm. 203
impolitus, Ehrh. 248
inquinans, Sm. 254
intricatus, Desf. 104
intricatus, Schrad. 152
Islandicus, L. 77
jubatus, L. 70
juniperinus, L. 79
lacerus, Sw, 47
lanatus, L. 101
lætevirens, Lightf. 91
lentigerus. Web. 128
leptophyllus, Ach. 266
leucomelos, L. 105
Lightfootii, Sm. 179
limbatus, Sm. 88
lucidus, Ach. 193
luridus, Sw. 170
luteoalbus, Turn. 136
luteus, Dicks. 177
lynceus, Sm. 229
macilentus, Ehrh. 62
mammillaris, Gouan. 173
marmoreus, Sm. 167
marginalis, Huds. 37
maurus, Sm. 284
melaleucus, Sm. 275

PAGE.
mesenteriformis, Wulf. 118
microcephalus, Sm. 225
microphyllus, Sw. 123
microphyllus, Sm. 57
miniatus, L. 265
milvinus, Whalb. 144
miscellus, Sm. 210
Morio, Ram. 192
multipunctatus, Sm. 274
murorum, Hoffm. 132
muscicola, Sw. 50
muscorum, Sw. 185
niger, Huds. 175
nigrescens, L. 42
nivalis, L. 79
obscurus, Sm. 243
ochroleucus, Ehrh. 71
oculatus, Dicks. 157
Œderi, Sm. 206
olivaceus, L. 99
omphalodes, L. 95
orosthcus, Sm. 150
pallescens, L. 155
pallidus, Sm. 269
palmatus, Huds. 48
Papillaria, Ehrh. 60
parasemus, Ach. 200
parietinus, L. 113
parilis, Ach. 81
Parrellus, L. 155
paschalis, L. 65
pellitus, Ach. 120
pericleus, Ach. 143
perforatus, Ach. 93
perlatus, L. 92
pertusus, Schrad. 98
pertusus, Sm. 275
petræus, Wulf. 220
phyllophorus, Ehrh. 55
pinastri, Scop. 79
pineti, Schrad. 176
pityreus, Ach. 111
plicatus, Sm. 69
plumbeus, Lightf. 121
plumbosus, Sm. 288
pollinarius, Ach. 74
polycarpus, Ehrh. 113
polydactylus, Neck. 84
polyphyllus, L. 116
polyhrrizus, L. 120
polytropus, Ehrh. 150
proboscideus, Ach. 118-119
prunastri, L. 72
pruinosus, Sm. 191
pubescens, Sm. 34
pulmonarius, L. 87
pulverulentus, Schreb. 110
punctatus, Dicks. 161
punctiformis, Ach. 305
pungens, Sm. 58
pulposus, Bernh. 38
pustulatus, L. 115
pyxidatus, L. 53
quadricolor, Dicks. 197
querneus, Dicks. 193
rangiferinus, L. 58
resupinatus, Sm. 81
rimosus, Sm. 219
Roccella, L. 75

PAGE.
rosellus, Pers. 182
rubellus, Ehrh. ,,
rubiformis, Sm. 62
rubiginosus, Thunb. 122
rufescens, Sm. 82
rupestris, Scop. 194
saccatus, L. 25
salicinus, Schrad. 137
sanguinarius, L. 213
sarmentosus, Ach. 70
saturninus, Dicks. 45
saxatilis, L. 94
saxicola, Pollich. 129
scalaris, Sm. 169
Schraderi, Bernh. 49
scopulorum, Retz. 74
scorteus, Ach. 93
scriptus, L. 237
scrobiculatus, Scop. 87
scruposus, L. 165
scutatus, Dicks. 83
sepincola, Ehrh. 80
serpentinus, Ach. 237
siderellus, Ach. 233
silaceus, Ach. 209
simplex, Sm. 160
sinopicus, Sm. ,,
sinuatus, Huds. 47
sinuosus, Sm. 95
smaragdulus, Sm. 159
sophodes, Ach. 142
sparassus, Sm. 56
speciosus, Wulf. 107
sphærocephalus, Sm. 258
sphæroides, Dicks. 177
spongiosus, Sm. 46, 86
spurius, Ach. 83
squamulosus, Schrad. 158
stellaris, L. 109
stictoceros, Sm. 72
stigmatellus, Sm. 305
stillicidiorum, Oed. 136
stygius, L. 101
subfuscus, L. 146
subtilis, Schrad. 47
subulatus, L. 58
sulphureus, Hoffm. 152
sylvaticus, L. 87
tartareus, L. 156
tenax, Sm. 40
tenellus, Scop. 106
tephroides, Sm. 268
terrestris, Sm. 294
tenuissimus, Dicks. 46
thelostomus, Sm. 293
tigillaris, Ach. 254
tiliaceus, Ehrh. 93
trabinellus, Sm. 261
trapeziformis, Sm. 268
tremelloides, L. 48
tristis, Weber. 76
tuberculosus, Sm. 162
tumidulus, Sm. 173
tumidulus, Pers. 155
Turneri, Sm. ,,
turgidus, Ehrh. 59
uliginosus, Schrad. 198
Ulmi, Sw. 166
uncialis, L. 59

PAGE.
Upsaliensis, Sm. 156
varius, Ehrh. 150
velatus, Sm. 275
vellus, L. 120
venosus, L. 84
vernalis, Sm. 182
ventosus, L. 157
vermicularis, Sw. 68
virellus, Ach. 110
viridescens, Schrad. 196
viridiflavescens, Wulf. 194
viridis, Schrad. 114
vitellinus, Ehrh. 135
vulgatus, Ach. 232
vulpinus, L. 71
LICHINA 33
confinis, Ag. 34
pygmæa, Ag. 33
LIMBORIA.
sphinctrina, Nyl 293
LITHOGRAPHA 225
tesserata, DC. ,,
LOPADIUM 190
fuscoluteum, Dicks ,,
pezizoideum, Ach. ,,
MALLOTIUM 44
Burgessii, Lightf. 45
saturninum, Dicks. 44
tomentosum, Kbr. 45
MASSALONGIA 125
carnosa, Dicks. 126
cheilea, Nyl. ,,
MEGALOSPORA 213
sanguinaria, L. ,,
MELANOSPORA 226
cerebrina, DC. ,,
MICROTHELIA 306
calcaricola, Mudd. ,,
gemmifera, Tayl 307
peripherica, Tayl. 308
pygmæa, Kbr. 307
rimosicola, Leight. 308
rugulosa, Borr. 306
ventosicola, Mudd. 307
MYRIANGIUM 50
Duriæi, Mont. & Berk. ,,
MYRIOSPERMA
pruinosa, Hepp 192
MYRIOSPORA
glaucocarpa, Hepp 159
  percæna, Hepp ,,
Heppii, Naeg. 160
rufescens, Hepp 159
smaragdula, Hepp ,,
NEPHROMA 80
lævigatum, Ach. 81
  parile, Ach. ,,
resupinata, Ach. ,,
NORMANDINA. 268
jungermanniæ, Del. ,,
viridis, Ach. 269
OCHROLECHIA
pallescens, Kbr. 155
  tumidula, Kbr. ,,
  Turneri, Kbr. ,,
parella, Massal. ,,
tartarea, Massal. 156
  alboflavescens, Massal. 155

PAGE.
- *Upsaliensis*, Massal. ... 156
- OPEGRAPHA... ... ...
- *anomala*, Leight. ... 237
- *astroidea*, Ach. 246
- atra, Pers. 232
  - arthonioides, Leight. .. ... ,,
  - denigrata, Ach, ... ,,
  - nigrita, Leight. ... ,,
  - parallela, Leight... ,,
  - *siderella*, Fr. ... 234
  - *stenocarpa*, Fr. ... 232
  - *steriza*, Nyl. ... 228
  - *vulgata*, Schær. ... 232
- *Betulina*, Sm. 231
- *calcarea*, Turn. 227
- *Cerasi*, Ach. 240
- *cerebrina*, DC. 226
- Chevallieri, Leight. ... 228
- *crassa*. Schær. 243
- *dendritica*, Ach 241
- *diaphora*, Sm. 230
- *elegans*, Sm. 242
- *epipasta*, Ach. 247
  - *microscopica*, Ach. ,,
- *gyrocarpa*, Kbr. 228
- herpetica, Ach. 234
  - divisa, Leight. .. 235
  - elegans, Borr ... 235
  - *fuscata*, Schær ... 234
  - *rubella*, Schær ... 235
  - rubida, Chev. ... ,,
  - rufescens, Pers. ... ,,
  - *siderella*, Schær... 234
  - subocellata, Ach... ,,
  - vera, Leight. ... ,,
- *Hutchinsiæ*, Kbr. ... 244
- *lentiginosa*, Lyell. ... 227
- *lithyrga*, Chev. 228
- *Lyellii*, Hook. ... 240-242
- lyncea, Borr. 228
- *Persoonii*, Ach. ... ... ,,
- *petræa*, Ach. 226
- *recta*, Humb. 240
- rubella, Moug. 233
  - taxicola, Leight... 234
- *rufescens*, Hook... ... ,,
- rupestris, Pers. 228
  - saxigena, Tayl. ... 229
- saxatilis, DC. 227
- *scripta*, Ach. 236
- *signata*, Ach. 230
- *sulcata*, Tayl. 242
- *tesserata*, DC. 226
- varia, Pers... 229
  - *chlorina*, Schær.... 230
  - diaphora, Ach. ... 231
  - *lichenoides*, Schær. 230
  - lutescens, Ach. ... ,,
  - notha, Ach... ... ,,
  - *phæa*, Schær. ... ,,
  - pulicaris, Lightf. ,,
  - rimalis, Fr.... ... 231
  - signata, Fr... ... 230
  - tigrina, Ach... ... ,,
  - tridens, Ach. ... ,,
- *venosa*, Sm.... 244
- vulgata, Ach. 232
  - dubia, Leight. ... 233

PAGE.
  - siderella, Ach. ... 233
  - stenocarpa, Ach... 232
- *vulvella*, Ach. 230
  - *lutescens*, Ach. ... ,,
- PACHYOSPORA
- *calcarea*, Massal... ... 162
- *cinerascens*, Massal. ... 163
- *ocellata*, Massal.... ... ,,
- *verrucosa*, Massal.. ... 164
- PANNARIA 121
- brunnea, Sw. 123
  - coronata, Hoffm... 124
- curvescens, Mudd. ... 125
- *cheilea*, Nyl... 126
- Hookeri, Sm. 125
- hypnorum, Vahl... .. 124
- *lanuginosa*, Kbr... ... 127
- microphylla, Sw... ... 123
- plumbea, Lightf... ... 121
  - myriocarpa, Del... 122
- rubiginosa, Humb. ... ,,
  - cœruleo-badia, Schl. ,,
- triptophylla, Ach. ... 123
  - *nigra*, Nyl.... ... 175
- PARMELIA 92
- Acetabulum, Neck. ... 99
- *adglutinata*, Tayl. ... 110
- *albescens*, Fr. 98
- aleurites, Ach. ... ... ,,
- *ambigua*, Borr. ... ... ,,
- *ambigua*, Ach. 103
- *amplissima*, Schær. ... 91
- *aquila*, Ach... 111
- *astroidea*, Fr. 109
- *atra*, Fr. 145
- *atrocinerea*, Fr. 144
- *aurantiaca*, Fr. 137
  - *flavofusca*, Fr. ... 138
- *aureola*, Ach. 113
- Borreri, Turn. 94
- *brunnea*, Fr... 124
- *cæsia*, Ach 107
- *calcarea*, Fr... 162
- *candelaria*, Ach... ... 114
- *candicans*, Fr. 133
- caperata, Dill. 101
- *carnosa*, Schær. 126
- *cartilaginea*, Ach. ... 128
- *ceratophylla*, Schær. ... 96
- *cerina*, Fr. 136
- *cervina*, Fr... 158
- *chalybæa*, Fr. 134
- *chloantha*, Ach. 110
- *chrysophthalma*, Fr. ... 112
- *ciliaris*, Fr.... 105
- *cinerea*, Fr.... 163
- *circinata*, Fr. 130
- *Clementi*, Turn. 109
- *coarctata*, Ach. 154
- *conoplea*, Ach. 122
- conspersa, Ehrh... ... 102
  - stenophylla, Ach... ,,
- *corrugata*, Ach. 99
- *crassa*, Fr. 127
- *cycloselis*, Ach. 109
- *diatrypa*, Ach. 98
- diffusa, Weber. 103
- *dubia*, Schær. 94
- *elegans*, Fr.... 131

PAGE.
- encausta, Sm. 97
  - candefacta, Ach.... ,,
  - stygioides, Linds... ,,
- *erosa*, Borr.... 108
- *erythrocarpia*, Fr. ... 139
- Fahlunensis, L. 100
- *ferruginea*, Fr. 190
- *flavicans*, Tayl. 112
- *Forsteri*, Leight. 95
- *frustulosa*, Fr. 145
- *fulgens*, Fr. 131
- *furfuracea*, Tayl... ... 72
- *galactina*, Ach. 149
- *gelida*, Fr. 130
- *glaucoma*, Leight. ... 153
- *glomulifera*, Ach... ... 91
- *Hæmatomma*, Fr... ... 158
- *herbacea*, Ach. 91
- *Hookeri*, Fr... 125
- hyperopta, Ach. 98
- *hypnorum*, Fr. 124
- incurva, Pers. 102
- *isidioides*, Borr. 107
- *lætevirens*, Schær. ... 91
- lanata, L. 101
- *lanuginosa*, Ach.... ... 127
- *lentigera*, Fr. 128
- *leucomela*, Fr. 108
- *microphylla*, Fr. 123
- Mougeotii, Schær. ... 102
- *multipunctata*, Schær... 97
- *murorum*, Fr. 132
- *muscorum*, Fr. 126
- *obscura*, Fr. 109
- *ochracea*, Fr. 138
- *oculata*, Fr. 157
- olivacea, L. 99
  - aquiloides, Linds. ,,
  - furfuracea, Schær. 100
- *ostreata*, Fr. 169
- *pallescens*, Fr. 155
- *parietina*, Ach. 113
- *pelobotrya*, Fr. 164
- *perforata*, Fr. 93
- perlata, Ach. 92
  - ciliata, DC.... ... ,,
- *pertusa*, Schær. 98
- physodes, L. 96
  - tuberculosa, Schær. 97
  - vittata, Ach. ... 96
- *pityrea*, Ach. 111
- *plumbea*, Ach. 121
- *proboscidea*, Tayl. ... 93
- *pulchella*, Schær. ... 107
- *pulverulenta*, Ach. ... 110
  - *augustata*, Schær. ,,
  - *grisea*, Schær. ... 111
  - *muscigena*, Schær. 110
- *quercifolia*, Schær. ... 93
- *reticulata*, Tayl. 96
- *rubiginosa*, Ach. ... 122
- *rubra*, Fr. 166
- *rugosa*, Tayl. 96
- saxatilis, L. 94
  - furfuracea, Schær. 95
  - leucochroa, Wallr. 94
  - omphalodes, L. ... 94
- *saxicola*, Fr. 129
- *scruposa*, Fr. 165

PAGE.
sinuosa, Sm. 95
  concentrica, Leight 96
  eratica, Linds. ... ,,
  lævigata, Sm. ... 95
sophodes, Fr. 142
sordida, Fr. 153
speciosa, Ach. 107
subfusca, Fr. 146
—*sulcata*, Tayl. 95
sulphurea, Leight. ... 152
stellaris, Ach. 109
stygia, L. 100
tartarea, Fr. 156
terebrata, Hoffm. ... 97
tiliacea, Ehrh. 93
  scortea, Ach. ... ,,
tribacea, Ach. 108
triptophylla, Fr. 124
tristis, Nyl. 76
ulmicola, Leight. ... 137
ulothrix, Tayl. 110
varia, Fr. 150
ventosa, Fr. 157
verrucosa, Fr. 164
  Pertusaria, ... 277
virella, Ach. 110
vitellina, Fr. 135
PATELLARIA.
clausa, Hepp. 279
fuscella, Hepp. 140
polytropa, Hoffm. ... 151
Rabenhorstii, Hepp. ... 141
rubra, Hepp. 166
PELTIDEA.
aphthosa, Ach. 82
canina, Ach. ... ... ,,
horizontalis, ... 84
polydactyla, Hook. ... ,,
rufescens, Hook 82
scutata, Ach. 83
spurea, Hook. ... ... ,,
venosa, Ach. 84
PELTIGERA. 81
aphthosa, L. ... ... ,,
canina, L. 82
  limbata, Del. ... 83
  pusilla, Dill. ... ,,
  rufescens, Hoffm. 82
  scutata, Dicks. ... 83
  sorediata, Schær. ,,
  spurea, Schær. ... ,,
crocca, Fr. 85
horizontalis, L. 84
polydactyla, Neck. ... 83
resupinata, Fr. 81
saccata, Fr. 85
sylvatica, Schær. ... 87
venosa, L. 84
PETRACTIS 278
exanthematica, Sm. ... ,,
PERTUSARIA.
ceuthocarpa, Sm. ... 271
  variolosa, Mudd .. ,,
communis, DC., ... 275
  areolata, Fr. ... 272
  rupestris, DC. ... ,,
  sorediata, Fr. ... 274
crassa, Hook. 243
globulifera, Sm. 273

PAGE.
  coccodes, Ach. ... 274
  multipunctata, Turn. ... ... ,,
  sorediata, Fr. ... ,,
glomerata, Schær. ... 277
fallax, Pers... 276
  sulphurea, Schær... ,,
  variolosa, Fr. ... ,,
Hutchinsiæ, T. & B. ... 277
lactescens, Mudd. ... 272
  lactea, Tayl... ... ,,
leioplaca, Ach. 276
lejoplaca, Schær.... ... ,,
macrospora, Hepp ... 277
melaleuca, Sm. 275
pustulata, Ach. ... ... ,,
rupestris, DC. 272
  areolata, Ach. ... ,,
  discoidea, Schær... ,,
  isidioidea, Schær. ,,
syncarpa, Mudd... ... 273
  corallina, L. ... ,,
  dealbata, Ach. ... ,,
velata, Sm. 274
Wulfenii, Fr. 275
PHIALOPSIS 165
livida, Mudd. 166
rubra, Hoffm. ... ... ,,
PHLYCTIS 279
agelæa, Ach .. .. ,,
argena, Ach. 280
PHYSCIA 111
astroidea, Nyl. 109
aquila, Nyl... 111
candelaria, L. 114
cœsia, Nyl. 107
chrysophthalma, L. ... 112
  Dickieana, Linds. ,,
ciliaris, Schær. 105
flavicans, Sw. 112
furfuracea, Schær. ... 72
intricata, Schær... ... 104
leucomela, Schær. .. 105
obscura, Nyl. 109
parietina, L... 113
  aureola, Ach. ... ,,
  citrinella, Fr. ... 114
  concolor, Dicks. ... ,,
  ectanea, Ach. ... 113
  lacinosa, Duf. ... ,,
  lobulata, Flk. ... ,,
  lychnea, Ach. ... 114
  polycarpa, Ehrh... 113
  viridis, Schreb. ... 114
prunastri, Schær... ... 72
pulverulenta, Nyl. ... 110
speciosa, Nyl. 107
stellaris, Nyl. 109
villosa, Ach... 112
PLACODIUM 130
arenarium, Hepp. ... 139
aurantiacum, Hepp ... 137
callopismum, Ach. ... 133
canescens, Hook.... ... 169
candicans, Dicks... ... 133
cartilagineum, Kbr. ... 128
cerinum, Hepp 136
chalybæum, Duf... ... 134
circinatum, Kbr... ... 130

PAGE.
disperso-areolatum, Kbr. 149
elegans, Link. 131
  discreta, Schær. ... ,,
ferrugineum, Hepp. ... 139
festivum, Hepp. ... ... ,,
fulgens, Sw... 131
gelidum, Kbr. 130
luteoalbum, Hepp. ... 137
microphyllum, Hook... 123
murorum, Hoffm. ... 132
  citrinum, Ach. ... ,,
  lobulatum, Hoffm. ,,
  miniatum, Hoffm. ,,
  steropeum, Ach... ,,
plumbeum, Hook... ... 122
radiosum, Massal. ... 130
vitellinum, Hepp... ... 135
PLATYGRAPHA 244
rimata, Fw... ... ... ,,
PLATYGRAMMA
elaborata, Leight. .. ,,
Hutchinsiœ, Leight. ... ,,
PLATYSMA
cucullatum, Nyl.. ... 78
glaucum, Nyl. 80
juniperinum, Nyl. ... 79
nivale, Nyl... ... ... ,,
sepincolum, Nyl... ... 80
POLYCHIDIUM 49
muscicolum, Sw... ... ,,
PSORA 169
atrobrunnea, Massal ... 205
atrocinerea, Hepp ... 144
atrorufa, Dicks.... ... 171
Caradocensis, Leight... 169
cœruleo-nigricans, Hook. 173
decipiens, Ehrh.... ... 171
exigua, Hepp. 142
fumosa, Massal. 211
glaucolepidea, Nyl. ... 171
glebulosa, Hook.... ... 154
globifera, Ach. 170
horiza, Hepp. 143
lurida, Sw. 170
ostreata, Hoffm.... ... 169
rubiformis, Hook. ... 62
scalaris, Hook. 169
sophodes, Hepp. 142
PSOROMA
crassa, Kbr. 127
lentigera, Massal- ... 128
PYCNOTHELIA.
Papillaria, Hook. ... 60
PYRENOTHEA.
corrugata, Massal. ... 177
leucocephala, Leight. ... 223
PYRRHOSPORA 192
quernea, Dicks. ... ... ,,
PYRENULA 298
œthibola, Ach. 287
elœina, Schær. 285
Funkii, Spreng. 287
hydrela, Schær. 285
maura, Schær. 284
nigrescens, Schær. ... 289
nitida, Weig. 298
  dermatodes, Borr. 299
  minor, Hepp. ... ,,
  nitidella, Flk. ... ,,

PAGE.
oxyspora, Hepp. 306
RAMALINA 72
calicaris, Fries. ... ... ,,
  canaliculata, Fr.... 73
  farinacea, L. ... ,,
  fastigiata, Ach. ... ,,
  fraxinea, L. ... ,,
  thrausta, Ach. ... ,,
pollinaria, Ach. 74
scopulorum, Retz. ... ,,
  polymorpha, Ach. ,,
tinctoria, Schær.... ... 75
RAPHIOSPORA 186
arenicola, Nyl. ... ... ,,
flavovirescens, Dicks. ,,
RHIZOCARPON 219
confervoides, Massal. ... 220
geographicum, L. ... 221
  atrovirens, L. ... ,,
  contiguum, Fr. ... ,,
  sphæricum, Schær. ,,
  urceolatum, Schær. ,,
Montagnei, Fw.... ... 219
petræum, Wulf. 220
  concentricum, Dav. ,,
  lavatum, Fr. ... ,,
  Oederi, Ach. ... ,,
RICASOLIA
glomulifera, Nyl. ... 91
herbacea, Nyl. .. ... ,,
RINODINA 142
albana, Kbr. 143
atrocinerea, Dicks. .. 144
exigua, Ach. 142
  horiza, Fw. 143
  metabolica, Ach... ,,
  periclea, Ach. .. ,,
sophodes, Ach. 142
ROCCELLA 75
fusciformis, L. 76
tinctoria, Ach. 75
  phycopsis, Ach. ... ,,
SAGEDIA
aggregata, Fr. 243
ænea, Kbr. 301
Borreri, Hepp. 296
carpinea, Massal. ... 301
cataractarum, Hepp. ... 294
chlorotica, Massal. ... 301
cinerea, Fr.... 269
circumscripta. Leight. 253
crassa, Massal. 243
fuscella, Fr... 288
ochrostoma, Borr. ... 290
pyrenophora, Hepp. ... 295
viridula, Fr. 290
SARCOGYNE
privigna, Kbr. 160
  simplex, Kbr. ... ,,
pruinosa, Kbr. 192
regularis, Kbr. ... ... ,,
SCHÆRERIA 212
lugubris, Sommf. ... 213
SCHISMATOMMA 222
abietinum, Ach. 223
amylaceum, Ehrh. ... 222
  candidum, Sm. ... ,,
premneum, Ach. ... ,,
  saxicolum, Leight. ,,

PAGE.
SCOLICIOSPORUM. ... 185
holomelænum, Massal... ,,
molle, Massal. 184
vermiferum, Nyl... ... 185
SCYPHOPHORUS
alcicornis, Hook... ... 52
bellidiflorus, Hook. ... 61
cæspititius, Hook. ... 67
cervicornis, Hook. ... 54
cocciferus, Hook... ... 60
cornutus, Hook. 61
deformis, Hook. ... ... ,,
digitatus, Hook. ... ... ,,
endivifolius, Hook. ... 52
filiformis, Hook... ... 62
fimbriatus, Hook... ... 53
gracilis, Hook. 55
microphyllus, Hook. ... 57
parasiticus, Hook. ... ,,
pyxidatus, Hook... .. 53
sparassus, Hook... ... 56
SEGESTRELLA 283
lectissima, Fr. 284
thelostoma, Leight. ... 293
umbonata, Kbr. 284
SEGESTRIA
thelostoma, Massal. ... 284
umbonata, Schær... ... ,,
SOLORINA 85
crocea, L. ... ... ,,
limbata, Sommf.... .. ,,
saccata, L. ... ... ,,
SPHÆROPHORON
compressum, Ach. ... 264
coralloides, Pers... ... 263
  cæspitosum, Hook. 264
  fragile, L. ... ... ,,
  laxum, Hook. ... ,,
melanocarpos, Schær... ,,
SPHÆROMPHALE 281
Carrollii, Mudd 283
elegans, Kbr. 281
fissa, Kbr. ... ... ,,
hymenogonia, Nyl. ... 282
nigrata, Nyl. ... ,,
scotinospora, Nyl. ... ,,
terebrata, Mudd... ... 281
umbrina, Wahlb... ... ,,
verrucoso-areolata,
  Schær. 282
SPHINCTRINA 255
anglica, Nyl. ... ... ,,
septata, Leight. 256
tubæformis, Kbr... ... ,,
turbinata, Pers. 255
  microcephala, Nyl. 256
SPHYRIDIUM
fungiforme, Kbr... ... 63
SPILOMA
gregarium, Hook. ... 249
tumidulum, Ach... ... ,,
SPILONEMA 34
paradoxum, Borr. ... 35
SPORASTATIA
Morio, Kbr... 192
SQUAMARIA 127
affinis, Hook. 122
candelaria, Hook. ... 114
candicans, Hook... ... 133

PAGE.
cartilaginea, Westr. .. 128
cæsia, Hook... 107
circinata, Pers. 130
crassa, Huds. 127
elæina, Hook. 110
fulgens, Hook. 131
gelida, L. 129
hypnorum, Hook... ... 124
lanuginosa, Hook. ... 127
lentigera, Weber. ... 128
leucolepsis, Hook... ... 125
miniatum, Hook... ... 132
murorum, Hook.. ... ,,
tribacea, Hook. 108
saxicola, Poll. 129
  areolata, Leight.... ,,
STENOCYBE 256
eusporum, Nyl. .. ... ,,
major, Nyl.... .. .. ,,
STENOGRAPHA 235
anguina, Mont. ... ... ,,
  diffusa, Leight. ... 236
  divaricata, Leight. ,,
  flexuosa, Leight... ,,
  pulverulenta,
    Leight. ... ... ,,
  radiata, Leight. ... ,,
anomala, Leight... ... ,,
STEREOCAULON 64
cereolina, Ach. 67
Cereolus, Borr. ... ... ,,
condensatum, Hoffm... 66
nanum, Ach. 67
paschale, L... 65
  alpinum, Laur. ... 66
  botryosum, Ach.... ,,
  corallinum, Laur... 65
  denudatum, Flk.... 66
quisquilare, Schær. ... 67
tomentosum, Fr. ... 65
STICTA 86
aurata, Sm.... 90
ciliata. Tayl. 91
crocata, L. 89
damæcornis, Ach. ... 88
  macrophylla, Hook. 89
Dufourii, Del. ... .. ,,
elegans, Deak. ... ... ,,
fuliginosa, Dicks. ... 88
glomulifera, Lightf. ... 91
herbacea, Huds. ... ... ,,
intricata, Del. 90
  Thoursii, Del. ... ,,
limbata. Sm. 88
pulmonacea, Ach. ... 87
pulmonaria, Hook. ... ,,
scorbiculata, Scop. ... ,,
sylvatica, L. ... ... ,,
STICTINA
intricata, Nyl. 90
STICTOGRAPHA 226
lentiginosa, Lyell. ... ,,
STIGMATELLA 252
circumscripta, Tayl. .. 253
STIGMATIDIUM 243
crassum, Dub. ... ... ,,
Hutchinsiæ, Leight. ... ,,
venosum, Sm. 244
STRIGULA 309

PAGE.
Babingtonii, Birk. ... 309
SYNALISSA 35
Acharii, Hepp. 35
ramulosa, Kbr. ... ... ,,
symphorea, DC. ... ... ,,
vulgaris, Thw. ... ... ,,
SYNCESIA
albida, Tayl. 245
SYNECHOBLASTUS ... 42
aggregatus, Ach. ... 43
complicatus, Schl. ... 44
conglomeratus, Hoffm. 43
flaccidus, Ach. 42
Laureri, Fw. 44
multipartitus, Sm. ... 43
nigrescens, L. 42
ruginosus, Hepp. ... 49
vespertilio, Kbr. 42
THALLOIDIMA 172
candidum, Web. ... ,,
mamillare, Gouan. ... 173
sublurida, Nyl. 172
visiculare, Hoffm. ... 173
THAMNOLIA 67
vermicularis, Sw. ... 68
THELIDIUM 294
aggregatum, Mudd. ... 298
biformis, Borr. 297
Borreri, Leight. 296
cataractarum, Hepp. ... 294
conoideum, Fries ... 296
elæinum, Borr. ... ... ,,
epipolytropum, Mudd. 298
gemmatum, Ach. ... 297
incavatum, Nyl. ... 295
immersum, Leight. ... ,,
pyrenophorum, Ach. ... 294
Salweii, Leight. 296
Zwackhii, Kbr. 294
THELOTREMA 278
clausum, Schær. 279
exanthematicum, Ach. ,,
fissum, Hepp. 281
Hutchinsiæ, T. & B. .. 277
melaleucum, Hook. ... 275
lepadnum, Ach. 278
  rupestre, T. & B. ,,
THROMBIUM
epigæum, Schær.... ... 294
TONINIA 173
aromatica, Turn. ... 174
squamulosa, Deak. ... ,,
TRAHCYLIA
arthonioides, Fr. ... 251
stigonella, Nyl. 255
tigilaris, Nyl. 254
tympanella, Nyl... ... ,,
UMBILICARIA 115
corrugata, Hoffm. ... 118
crinita. Massal. 119
cylindrica, Nyl. ... .. ,,
erosa, Fr. 117
hyperborea, Fr. ... ... ,,
murina, DC. 120
polymorpha, Schær. ... 117
polyphylla, Fr. 116
polyrrhizos, Fr. 120
proboscidea, Fr. 118
pustulata, Hoffm. ... 116

PAGE.
varia, Leight. 110
vellea, Fr. 125
URCEOLARIA 165
Acharii, Hook. 161
  cyrtaspis, Ach. ... ,,
calcarea, Ach. 162
  cinerascens, Schær. 163
cinerea, Ach. ... ... ,,
  atrocinerea, Schær. 215
  ochracea, Schær.... 164
cinereo-rufescens, Ach. 163
contorta, Flk. 162
foveolaris, Ach. 167
gibbosa, Ach. 162
ocellata, Flk. 163
pelobotrya, Wahlb. ... 164
rufescens, Hook.... ... 152
scruposa, L... 165
  bryophila, Ach. ... ,,
verrucosa, Ach. 164
USNEA... 68
barbata, Fries ... ... ,,
  articulata, L. ... 69
  dasopoga, Ach. ... ,,
  florida, L. ... ... ,,
  hirta, L. ... ... ,,
  plicata, L. ... ... ,,
VARIOLARIA
agelæa, Hook. 280
argena, Hook. ... ... ,,
aspergilla, Sm. 274
chloantha, Tayl.... ... 273
constellata, Tayl... ... 274
corallina, Tayl. 273
discoidea, Hook.... ... 274
faginea, Hook. ... ... ,,
globulifera, Hook. ... ,,
griseo-virens, Hook. ... ,,
lactea, Tayl... 273
multipunctata, T. & B. 274
polythecia, Tayl.... ... 273
velata, Hook. 275
VERRUCARIA 284
acrotella, Tayl. 293
aquatilis, Mudd 285
biformis, Borr. 297
Borreri, Leight.... ... 296
calciseda, DC. 292
carpinea, Ach. 301
chlorotica, Ach. 285
cinerea, Pers. 305
cinereo-pruinosa, Schær. ,,
circumscripta, Tayl. ... 253
cærulea, Schær. 288
codonoidea. Leight. ... 301
concinna, Borr. 291
conoidea, Fr... 297
dermatodes, Borr. ... 299
Dufourii, DC. 290
Dufourii, Borr. 296
elæina, Borr. ... ... ,,
elæina, Massal. 287
epidermidis, Ach. .. 303
  analepta, Hook. ... 304
epigæa, Ach. 293
epipolæa, Borr. 297
epulotica, Borr. 266
erysiboda, Tayl. 284
fallax, Pers... 276

PAGE
fissa, Tayl. 281
fumago, Wallr. 302
fuscella, Turn. 288
  glaucina, Ach. ... 289
fuscoatra, Kbr. ... .. ,,
fusiformis, Leight. ... 301
Garovaglii, Mont. ... 270
gemmata, Ach. 297
gemmifera, Tayl... ... 307
Hookeri, Borr. 271
hydrela, Ach. 285
hymenogonia, Nyl. ... 282
immersa, Leight... 293-295
irrigua, Tayl. 284
isidioides, Borr. 270
Laburni, Leight... ... 302
lætevirens. Borr.... ... 269
lavata, Ach... 286
lectissima, Nyl. 284
Leightonii, Hepp. ... 287
  umbrina, Leight... ,,
leucocephala, Borr. ... 223
linearis, Leight.... ... 300
lucens, Tayl... ... ... ,,
Lyellii, Leight. 306
macrocarpa, Tayl. ... 260
macularis, Wallr... ... 301
margacea, Fr. 285
margacea, Leight. ... 294
maura, Wahlb. 284
muralis, Borr. 282
murina, Leight. 291
mutabilis, Borr. 293
myriocarpa, Hepp. ... 291
nigrata, Nyl. 283
nigrescens, Pers.... ... 289
  macrostoma, Duf. ,,
  viridula, Nyl. ... 290
nitescens, Salw. 303
nitida, Schrad. 299
  minor, Leight. ... ,,
obscura, Borr. 243
ochrostoma, Borr. ... 290
olivacea, Borr. 302
oxyspora, Nyl. 306
pallida, Nyl. 269
papillosa, Ach. 287
patula, Leight. 292
perminuta, Deak. ... 301
peripherica, Tayl. ... 308
plumbea, Ach. 288
  cineracea, Mudd... ,,
polysticta, Borr... ... ,,
psoromoides, Borr. ... 267
prominula, Nyl. 291
pulchella, Borr. 269
punctiformis, Hook. ... 305
rhyponta, Ach. 303
rimosicola, Leight. ... 308
rugulosa. Borr. 306
rupestris, Schrad. ... 291
  muralis, Ach. ... 292
  purpurascens, Hoffm. ,,
  subalbicans, Leight. ,,
Salweii, Leight. 296
scotinospora, Nyl. ... 282
sordidata, Borr. 270
Sprucei, Leight. 295
stigmatella, Ach. ... 304

PAGE.
striatula, Hook. 293
submersa, Borr. 286
Taylori, Carr. 302
tephroides, Nyl. 268
thelostoma, Harrim. ... 293
trachona, Tayl. 301

PAGE.
umbrina, Wahlb. ... 281
  calcarea, Nyl. ... ,,
umbrosa, Tayl. 300
Unionis, Schær. 287
verucoso-areolata, Nyl. 282
viridula, Schrad.... ... 289

PAGE.
ZEORA
sordida, Kbr. 153
  glaucoma, Kbr. ... ,,
  subcarnea, Kbr. ... ,,
sulphurea, Kbr. 152

INDEX TO THE FASCICULI.

NO.		PAGE.
1	Collema pulposum	38
2	,, crispum	40
3	,, cheileum	40
4	Leptogium tenuissimum	46
5	,, lacerum	47
6	,, sinuatum	47
7	Cladonia pyxidata, *v.* fimbriata, *subv.* tubæformis	54
8	,, ,, denticulata	54
9	,, gracilis, *v.* cervicornis	54
10	,, ,, hybrida	55
11	,, ,, simplex	55
12	,, degenerans, *subv.* phyllophora	55
13	,, squamosa, *v.* ventricosa	56
14	,, ,, microphylla, *subv.* prolifera	56
15	,, ,, delicata	56
16	,, furcata, *v.* racemosa, *subv.* erecta	58
17	,, pungens	58
18	,, ,, ,, decumbens	58
19	,, rangiferina	58
20	,, ,, sylvatica	59
21	,, uncialis, *v.* elatior	59
22	,, Papillaria	59
23	,, coccifera, *v.* bellidiflora	60
24	,, ,, Floerkeana	60
25	,, ,, deformis, *subv.* tubæformis	60
26	,, ,, digitata	60
27	,, ,, macilenta, *subv.* polydactyla	62
28	,, ,, ,, corymbiformis	62
29	,, ,, ,, filiformis	62
30	Bæomyces Byssoides	63
31	,, roseus	63
32	Icmadophila aeruginosa	64
33	Stereocaulon condensatum	66
34	Usnea barbata, *v.* florida	69
35	,, ,, hirta	69
36	,, ,, plicata	69
37	Alectoria jubata	70
38	,, ,, chalybeiformis	70
39	,, bicolar	70
40	Evernia furfuracea	71
41	,, prunastri	72
42	Ramalina calicaris, *v.* fraxinea	73
43	,, ,, fastigiata	73
44	,, ,, canaliculata	73
45	,, ,, farinacea	73
46	,, pollinaria	74
47	,, scopulorum, *v.* polymorpha	74
48	Roccella tinctoria, *v.* phycopsis	75
49	Cornicularia aculeata	77
50	,, ,, coelocaula	77
51	,, islandica	77
52	,, ,, crispa	77
53	Cetraria nivalis	78
54	,, glauca	79
55	,, ,, fallax	80
56	,, sepincola	80
57	Nephroma lævigatum	81
58	Peltigera aphthosa	81
59	,, canina	82
60	,, ,, rufescens	82
61	,, polydactyla	83
62	,, horizontalis	84
63	Solorina saccata	85
64	Sticta pulmonacea	87
65	,, scrobiculata	87
66	Parmelia saxatilis, *v.* leucochroa	94
67	,, ,, omphalodes	95
68	,, sinuosa	95
69	,, ,, lævigata	95
70	,, physodes	96
71	,, aleurites	98
72	,, olivacea	99
73	,, caperata	101
74	,, Mougeotii	102
75	,, diffusa	103
76	Borrera intricata	104
77	,, ciliaris	105
78	,, hispida, *v.* tenella	106
79	,, stellaris	109
80	,, obscura	109
81	,, ,, chloantha	110
82	,, pulverulenta	110

NO. PAGE.
83 Borrera pulverulenta, *v.* grisea 111
84 Physcia flavicans 112
85 „ parietina 113
86 „ „ lacinosa ... 113
87 Gyrophora polyphylla ... 116
88 „ cylindrica ... 118
89 „ polyrrhizos ... 119
90 Pannaria brunnea 123
91 Squamaria crassa 127
92 „ saxicola .. 129
93 „ „ areolata 129
94 Placodium murorum ... 132
95 „ „ lobulatum 132
96 „ callopismum ... 133
97 Callopisma cerinum ... 135
98 „ luteoalbum ... 136
99 „ aurantiacum, *v.* salicinum 137
100 „ „ flavovirescens 137
101 „ „ inalpinum 137
102 „ ferrugineum ... 139
103 Lecania cœrulescens ... 140
104 „ erysibe 141
105 „ „ Rabenhorstii 141
106 „ „ cinereofusca 141
107 Rinodina exigua 142
108 „ „ metabolica 143
109 „ „ horiza ... 143
110 Lecanora badia 144
111 „ atra 145
112 „ subfusca 146
113 „ „ glabrata 146
114 „ abbella, *v.* angulosa 148
115 „ „ Hageni 148
116 „ galactina ... 149
117 „ varia, *v.* symmicta 150
118 „ „ denigrata 151
119 „ polytropa ... 151
120 „ „ conglobata 152
121 „ sulphurea ... 152
122 „ glaucoma ... 153
123 „ coarctata, *v.* ornata 154
124 „ „ elacista 154
125 Lecanora pallescens, *v.* parella 155
126 „ „ tumidula 155
127 „ „ Turneri 155
128 „ tartarea 156
129 Hæmatomma ventosum ... 157
130 „ coccineum ... 157
131 Acarospora cervina, *v.* squamulosa 158
132 „ smaragdula ... 159
133 Aspicilia calcarea 161
134 „ „ contorta 162
135 „ cinerea 162
136 „ ochracea 163
137 Urceolaria scruposa ... 165
138 Phialopsis rubra 166
139 Gyalecta cupularis ... 166
140 „ truncigena ... 167
141 Psora ostreata 169
142 „ Caradocensis ... 169
143 Thalloidima vesiculare ... 173
144 Lecothecium nigrum ... 175
145 Biatorina pineti 176
146 „ pyracea 178
147 „ grossa 181
148 Bacidia luteola, v. fuscella 183
149 „ „ inundata 183
150 „ „ cæsiopruinosa 183
151 „ incompta ... 184
152 „ muscorum ... 184
153 Scoliciosporum vermiferum 185
154 Bilimbia sphæroides 187
155 „ anomala 187
156 „ milliaria, v. terrestris 188
157 „ „ saxatilis 188
158 „ „ lignaria 188
159 „ „ melæna 188
160 Biatorella pruinosa 191
161 Lecidea rupestris 193
162 „ conglomerata ... 194
163 „ minuta 194
164 „ prasina 196
165 „ decolorans ... 197
166 „ „ viridula 197
167 „ uliginosa 197
168 „ rivulosa 199
169 „ parasema 200
170 „ „ elœochroma 200
171 „ turgidula 201
172 „ goniophila ... 202
173 „ „ acervata 202
174 „ intumescens ... 205
175 „ aggregata 208
176 „ expansa 208
177 „ crustulata ... 209
178 „ lapicida 209

NO. PAGE.
179 „ contigua, *v.* platycarpa 210
180 „ „ confluens 210
181 „ albocœrulescens ... 211
182 „ fumosa 211
183 Schæreria lugubris... .. 213
184 Megalospora sanguinaria ... 213
185 Buellia coracina 214
186 „ verruculosa ... 215
187 „ disciformis ... 216
188 „ „ rugulosa 217
189 „ myriocarpa ... 217
190 „ „ punctiformis 217
181 Diplotomma alboatrum ... 218
192 „ „ populorum 218
193 „ „ epipolium 219
194 „ calcareum ... 219
185 Rhizocarpon petræum ... 220
196 „ geographicum, *v.* atrovirens 221
197 Schismatomma premneum 222
198 „ „ saxicolum 222
199 „ amylaceum, *v.* candidum 222
200 „ abietinum... 223
201 Abrothallus Smithii ... 224
202 Opegrapha saxatilis ... 227
203 „ Chevallieri .. 228
204 „ lyncea 229
205 „ varia, *v.* tigrina 230
206 „ „ diaphora 231
207 „ „ rimalis 231
208 „ atra, *v.* denigrata 232
209 „ „ parallela 232
210 „ „ nigrita 232
211 „ vulgata ... 232
212 „ „ siderella 233
213 „ rubella... ... 283
214 „ herpetica, *v.* rufescens 235
215 Stenographa anguina, *v.* radiata 236
216 „ „ divaricata 236
217 Graphis scripta, *v.* horizontalis 238
218 „ „ radiata 238
219 „ „ tremulans 239
220 „ „ eutypa 239
NO. PAGE.
221 „ „ diffracta, *subv.* minor 240
222 „ „ „ radiata 240
223 Aulacographa elegans ... 242
224 Stigmatidium crassum ... 243
225 „ Hutchinsiæ ... 243
226 „ „ corticolum 243
227 Arthonia astroidea... ... 246
228 „ „ Swartziana 246
229 „ „ anastomosans 246
230 „ epipasta 247
231 „ punctiformis .. 247
232 „ „ olivacea 247
233 „ gregaria, *v*, marginata 249
234 „ „ astroidea 250
235 „ vinosa 250
236 „ lurida 250
237 „ trachylioides ... 251
238 „ parasemoides ... 251
239 Stigmatella circumscripta .. 253
240 Acolium tympanellum ... 254
241 Sphinctrina turbinata ... 255
242 Stenocybe eusporum ... 256
243 Calicium curtum 257
244 „ quercinum ... 257
245 „ hyperellum ... 258
246 „ trachelinum ... 258
247 „ subtile 258
248 Cyphelium trichiale, v. stemoneum 260
249 „ „ ferrugineum 260
250 „ „ brunneolum 260
251 „ chrysocephalum 261
252 „ chlorellum ... 262
253 Sphærophoron coralloides... 264
254 „ compressum 264
255 Endocarpon miniatum ... 265
256 „ „ complicatum... 265
257 „ pusillum ... 268
258 Normandina viridis ... 269
259 Pertusaria rupestris, *v.* areolata 272
260 „ lactescens ... 272
261 „ syncarpa ... 273
262 „ globulifera, *v.* multipunctata 274

NO. PAGE.
263 „ „ sorediata 274
264 „ communis ... 275
265 „ pustulata ... 275
266 „ fallax 276
267 „ leioplaca ... 276
268 Thelotrema lepadinm ... 278
269 Phlyctis agelæa 279
270 Verrucaria maura 284
271 „ aquatilis .. 285
272 „ chlorotica ... 285
273 „ lævata 286
274 „ papillosa ... 287
275 „ plumbea, *v.* cineracea 288
276 „ fuscella ... 288
277 „ nigrescens ... 288
278 „ „ macrostoma... 288
279 „ viridula .. 288
280 „ calciseda ... 291
281 Thelidium cataractarum ... 293
282 „ incavatum ... 294
283 „ immersum ... 294
284 „ conoideum ... 295
285 „ gemmatum ... 297

NO. PAGE.
286 „ biformis ... 297
287 „ epipolytropum ... 298
288 Arthopyrenia macularis ... 300
289 „ „ fusiformis 301
290 „ olivacea ... 301
291 „ fumago ... 302
292 „ epidermidis, *v.* fallax 303
293 „ „ analepta 304
294 „ „ lactea 304
295 „ „ cinerea 304
296 „ „ punctiformis 305
297 „ „ cinereo-pruinosa, *subv.* galactites 305
298 „ „ atomaria 305
299 „ oxyspora ... 306
300 Microthelia ventosicola ... 307
301 „ rimosicola ... 308

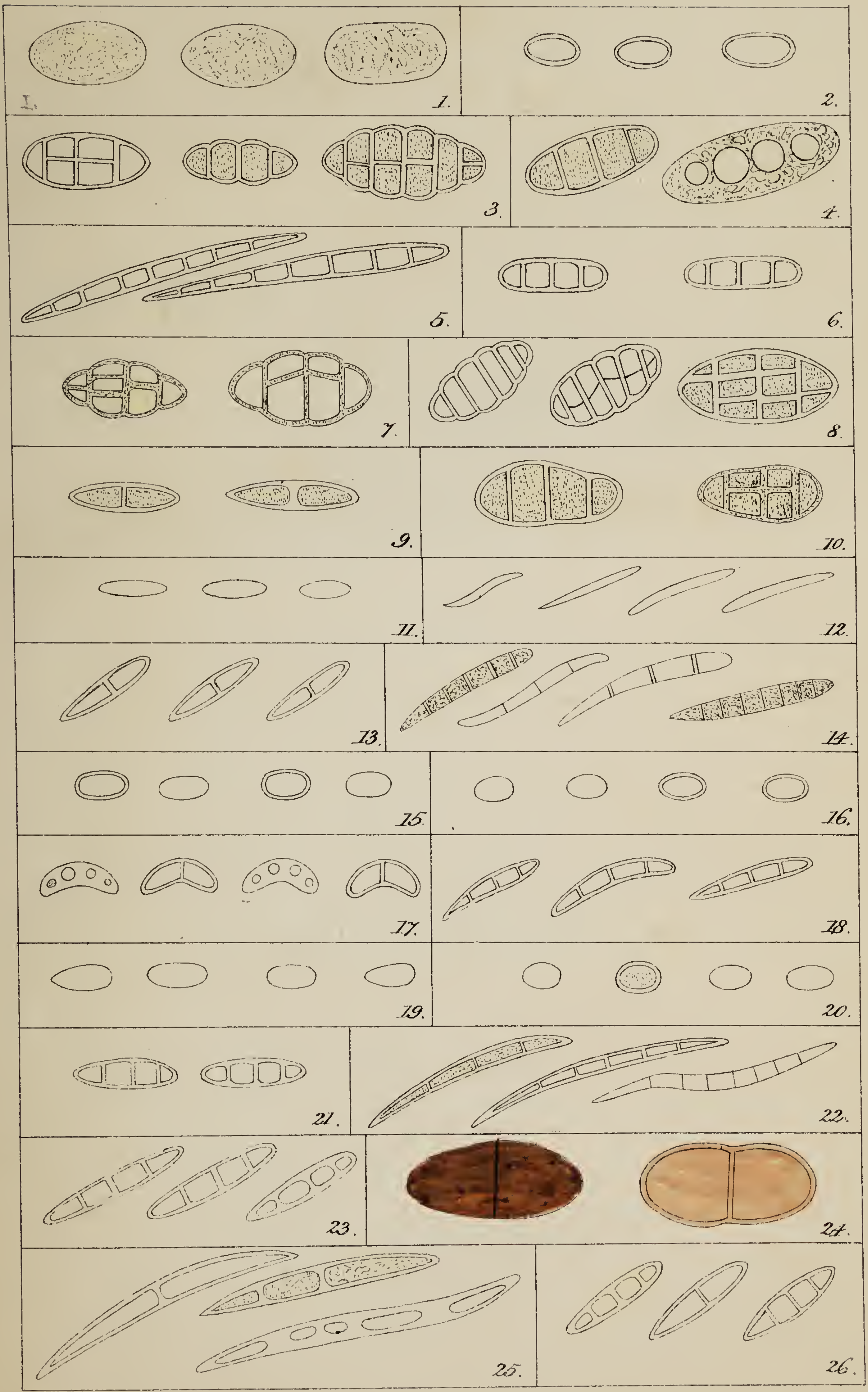
INDEX TO THE PLATES.

NO.		PAGE.
1	Lichina pygmæa	33
2	Synalissa symphorea	35
3	Collema pulposum	38
4	„ cheileum	40
5	Synechoblastus nigrescens	42
6	„ complicatus	44
7	Mallotium saturninum	44
8	Leptogium subtile	46
9	Polychidium muscicolum	49
10	Myriangium Duriæi	50
11	Cladonia coccifera	60
12	Bæomyces roseus	63
13	Icmadophila aeruginosa	64
14	Stereocaulon pashale, *v.* corallinum	65
15	Usnea barbata	68
16	Evernia furfuracea	71
17	Ramalina calicaris	72
18	Roccella fuciformis	76
19	Cornicularia islandica	77
20	Cetraria glauca	79
21	Nephroma lævigatum	81
22	Peltigera canina	82
23	„ venosa	84
24	Solorina saccata	85
25	Sticta pulmonacea	87
26	„ scrobiculata	87
27	„ herbacea	91
28	Parmelia tiliacea	93
29	„ Borreri	94
30	„ caperata	101
31	Borrera cæsia *v.* albinea	108
32	„ astroidea	108
33	Physcia flavicans	112
34	Physcia chrysophthalma	112
35	Umbilicaria pustulata	115
36	Gyrophora polyphylla	116
37	Pannaria brunnea	123
38	„ curvescens	125
39	Massalongia carnosa	126
40	Squamaria lentigera	128
41	Placodium elegans	131
42	„ callopismum	133
43	Callopisma ochraceum	138
44	„ Lallavei	139
45	Lecania fuscella	140
46	„ cœrulescens	140
47	„ erysibe	141
48	„ „ cinereofusca	141
49	Rinodina atrocinerea	143
50	Lecanora badia	144
51	„ tartarea	156
52	Hæmatomma ventosum	157
53	Acarospora cervina	158
54	Aspicilia epulotica	161
55	„ calcarea	161
56	„ verrucosa	164
57	Urceolaria scruposa	165
58	Phialopsis rubra	166
59	Gyalecta cupularis	167
60	Diploicia canescens	169
61	Psora Caradocensis	169
62	„ glaucolepidea	171
63	Thalloidima vesiculare	173
64	Toninia aromatica	174
65	Lecothecium nigrum	175
66	Biatorina sphæroides	177
67	„ grossa	181
68	Bacidia rubella	182
69	Scoliciosporum vermiferum	185
70	Raphiospora flavo-virescens	186
71	Bilimbia milliaria	188
72	Bombyliospora pachycarpa	189
73	Lopadium fusco-luteum	190
74	Biatorella pruinosa	191
75	Pyrrhospora quernea	192
76	Lecidea intumescens	205
77	„ vitellinaria	212
78	Schæreria lugubris	213
79	Megalospora sanguinaria	213
80	Buellia atrata	215
81	„ badioatra	214
82	Diplotomma alboatrum	218
83	Rhizocarpon geographicum	221
84	Schismatomma amylaceum	222
85	Dactylospora inspersa	224
86	Abrothallus Smithii	224
87	Lithographa tesserata	224
88	Melanospora cerebrina	226
89	Stictographa lentiginosa	226
90	Opegrapha rubella	233
91	Stenographa anguina	235
92	Graphis scripta	237
93	Aulacographa elegans	242
94	Stigmatidium Hutchinsiæ	243
95	Platygrapha rimata	244

NO.		PAGE.
96	Chiodecton myrticola ...	245
97	Arthonia aspersa	248
98	„ trachylioides ...	251
99	Arthothelium dispersum ..	252
100	Stigmatella circumscripta...	253
101	Acolium tympanellum ...	254
102	Sphinctrina turbinata ...	255
103	Stenocybe eusporum ...	256
104	Calicium populneum ...	257
105	„ hyperellum ...	258
106	Cyphelium trichiale, *v.* ferrugineum...	260
107	„ chlorellum ...	262
108	Coniocybe furfuracea ...	262
109	Sphærophoron coralloides...	264
110	Endocarpon psoromoides ...	267
111	Dermatocarpon Garovaglii	270
112	Decampia Hookeri... ...	270
113	Pertusaria syncarpa ...	273
114	„ velata	274
115	Sphæromphale Carrolli ...	283
116	Thelotrema lepadinum ...	278
117	Petractis exanthematica ...	278
118	Phlyctis agelæa	279
119	Sphæromphale verrucoso-areolata	282
120	Segestrella lectissima ...	284
121	Verrucaria aquatilis ...	285
122	Thelidium incavatum ...	294
123	„ immersum ...	294
124	Pyrenula nitida	299
125	Arthopyrenia macularis ...	300
126	„ epidermidis, *v.* fallax	303
127	„ oxyspora ...	306
128	Microthelia calcaricola ...	306
129	„ rimosicola ...	308
130	Strigula Babingtonii ...	309

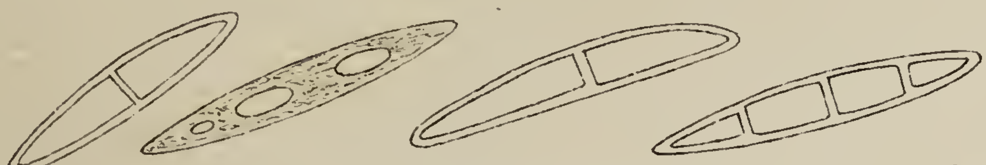
Harrison Penney, Printer, Prebend Row, Darlington.

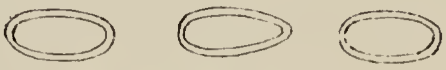
SPORES.

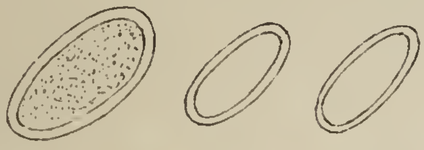


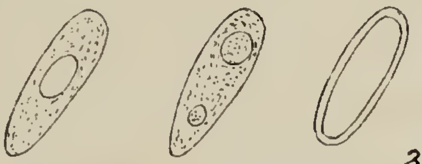
Wm Mudd. del.

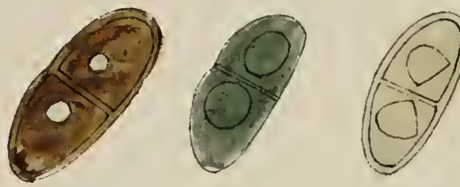
SPORES.

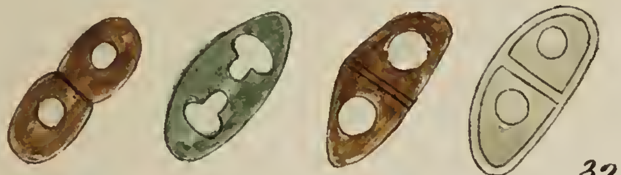

27.

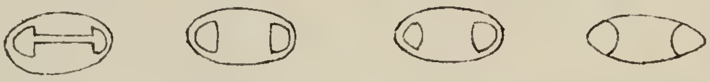

28.

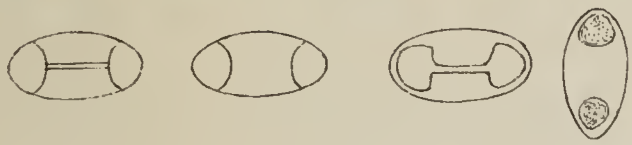

29.

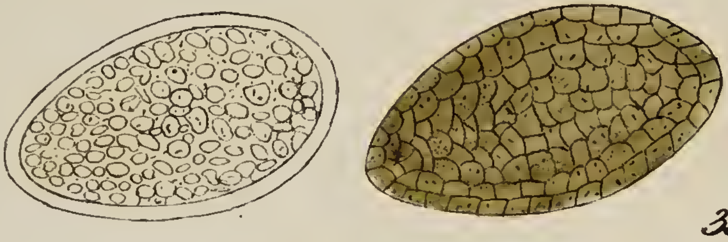

30.

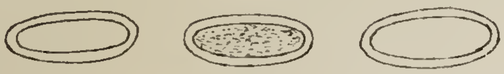

31.

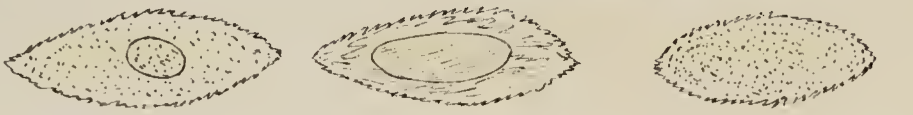

32.

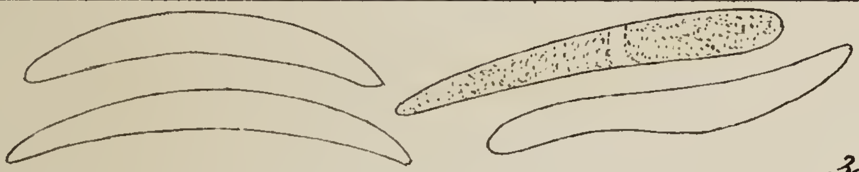

33.

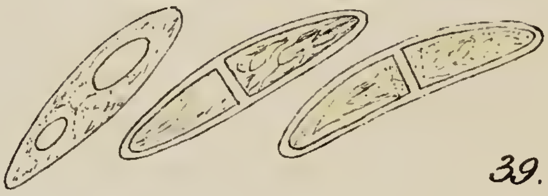

34.

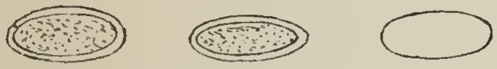

35.

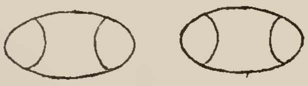

36.

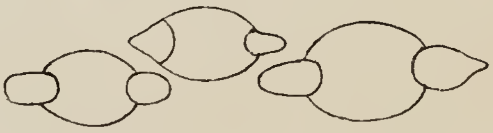

37.

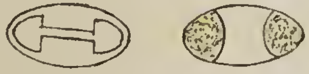

38.

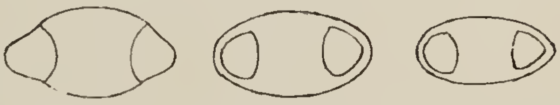

39.

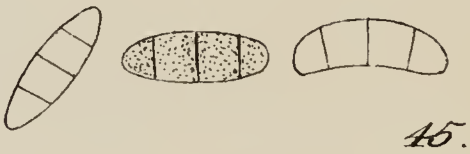

40.

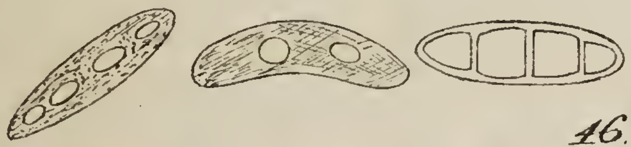

41.

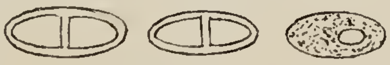

42.

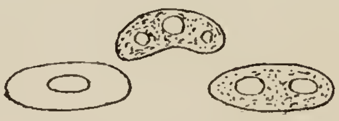

43.

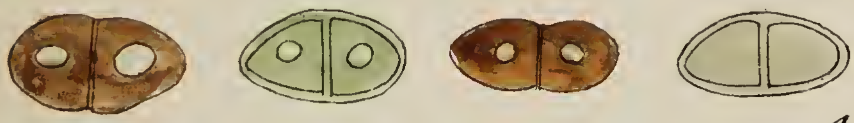

44.

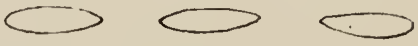

45.

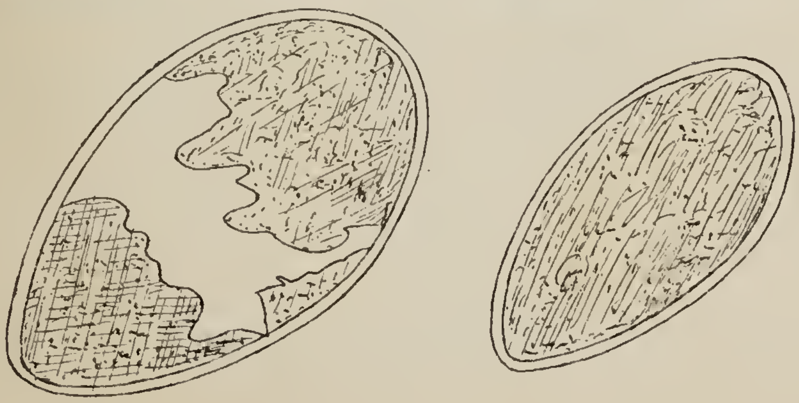

46.

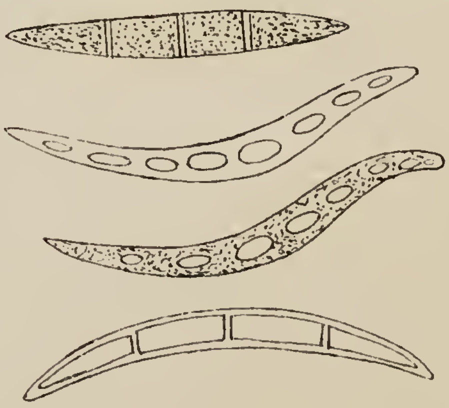

47.


48.


49.


50.

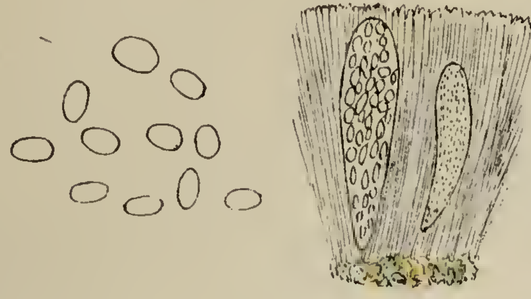

51.

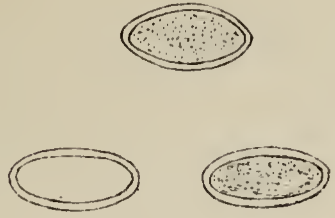

52.

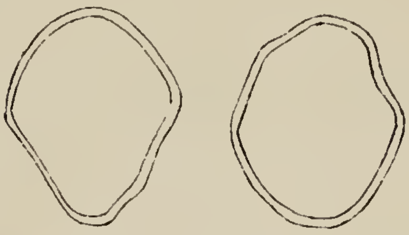
Wm Mudd del.

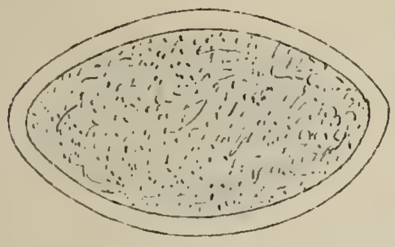
SPORES.

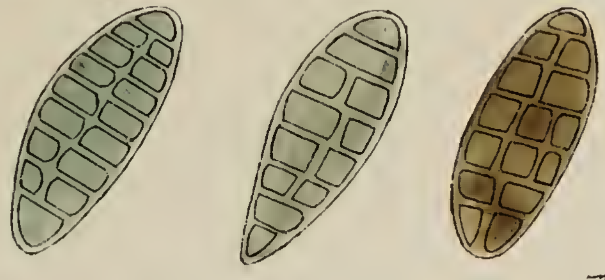
Pl. III.

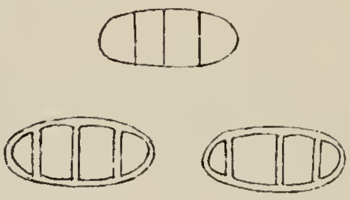

53.

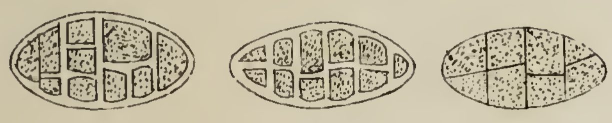

54.

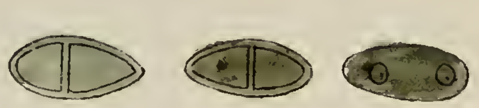

55.

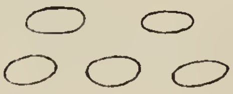

56.

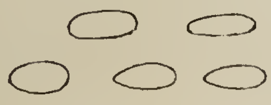

57.

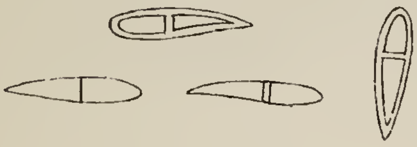

58.

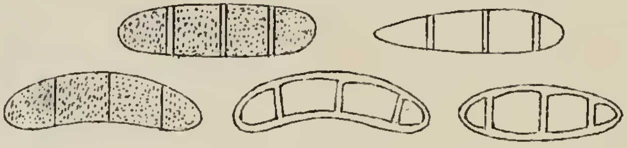

59.

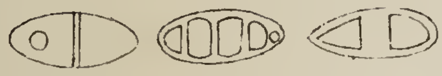

60.

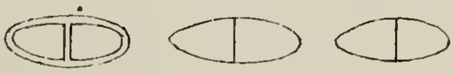

61.

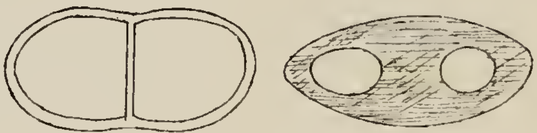

62.

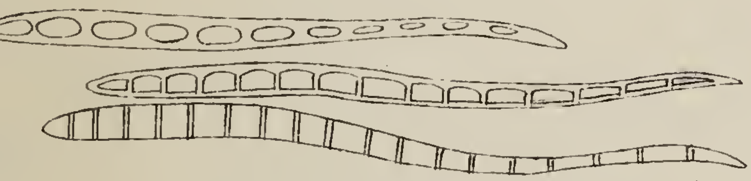

63.

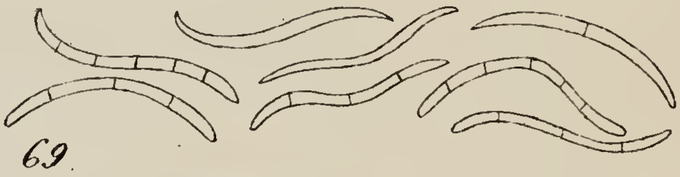

64.

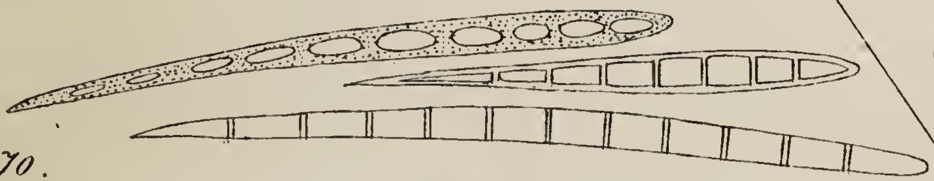

65.

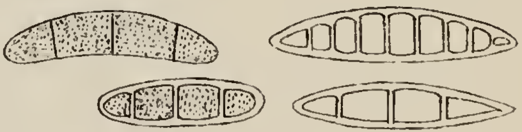

66.

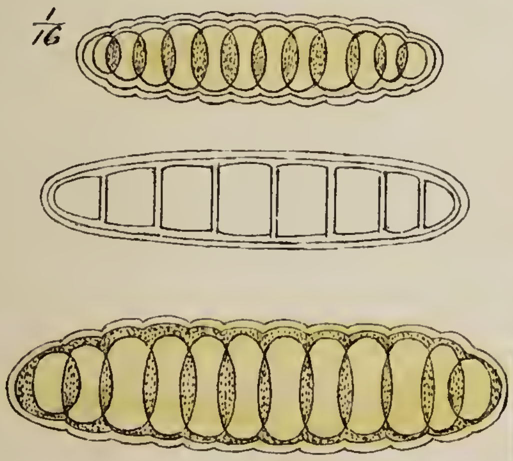

67.


68.

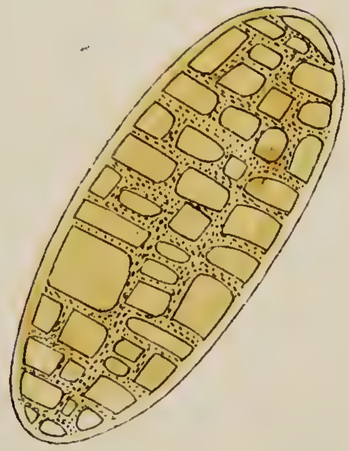

69.

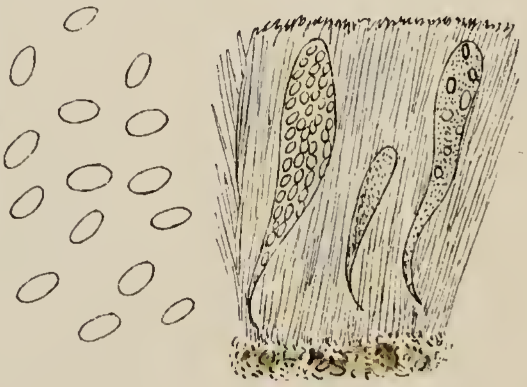

70.

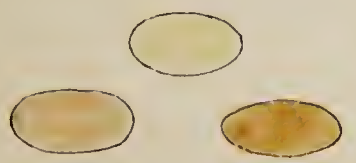

71.

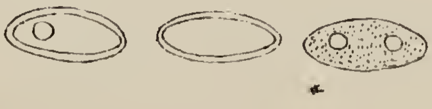


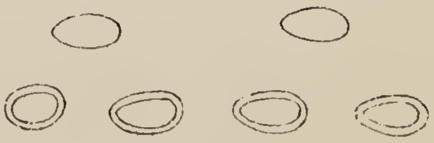
72.


73.


74.


75.

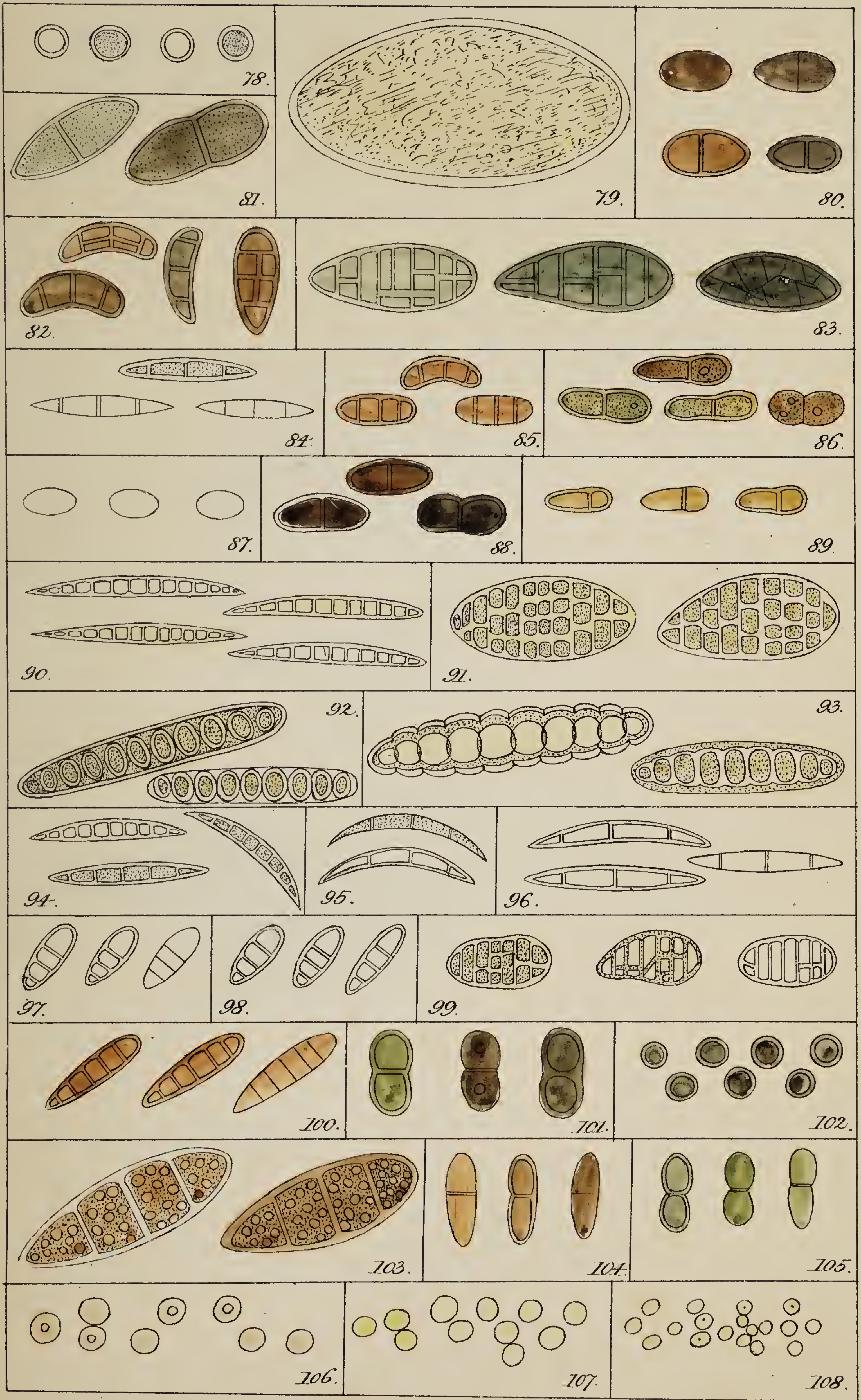

76.


77.

Wm Mudd del.

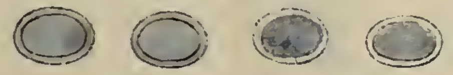
SPORES.

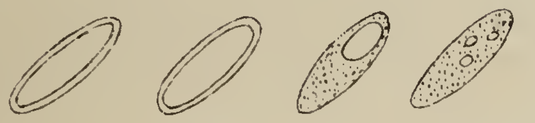
Pl. IV.

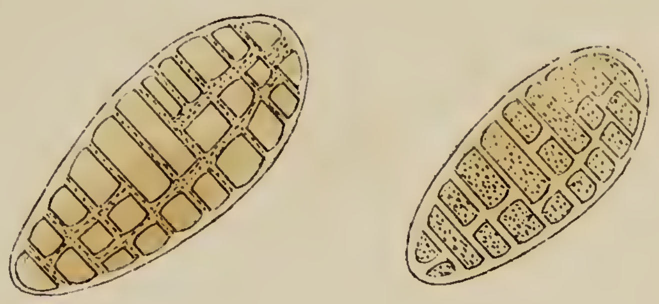


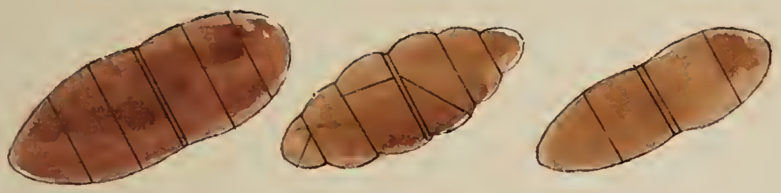
Wm. Mudd. del.

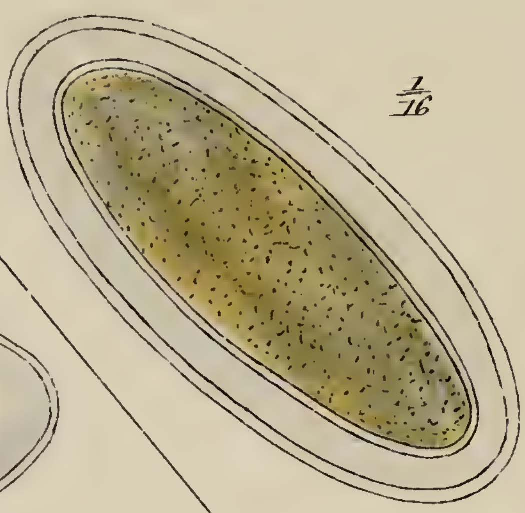
SPORES.


109.

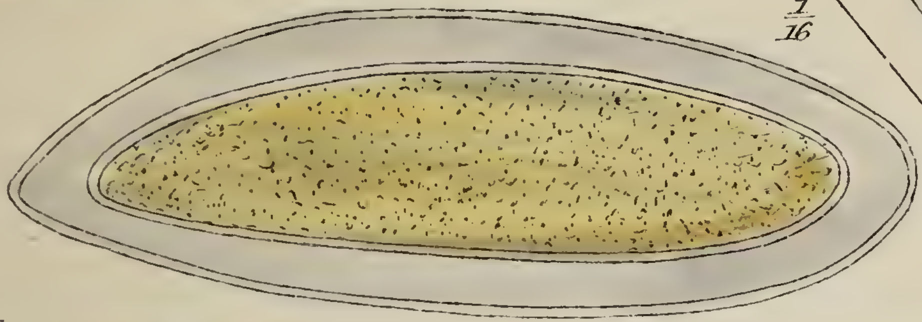

110.


111.

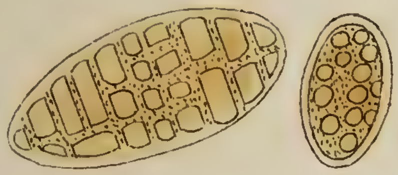

112.

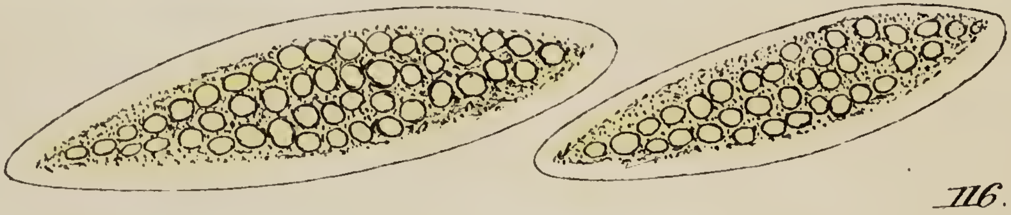


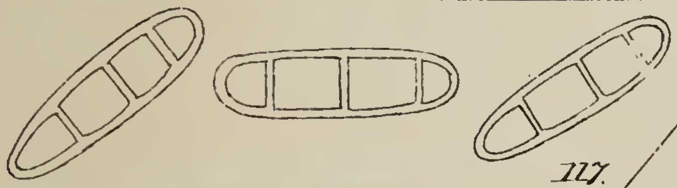
113.

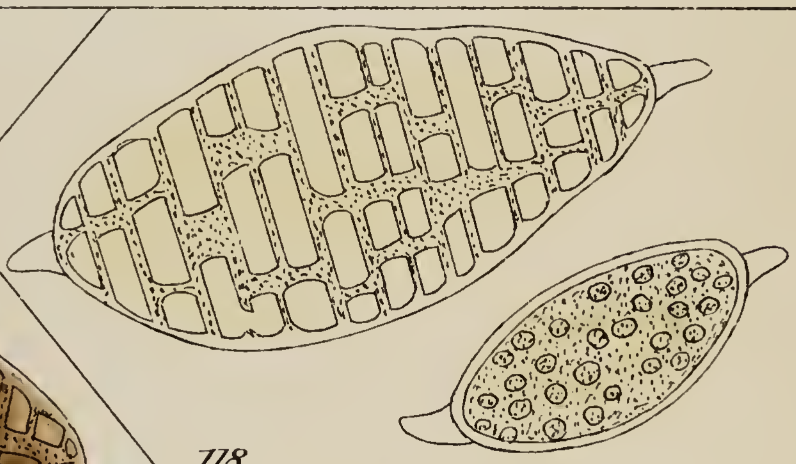


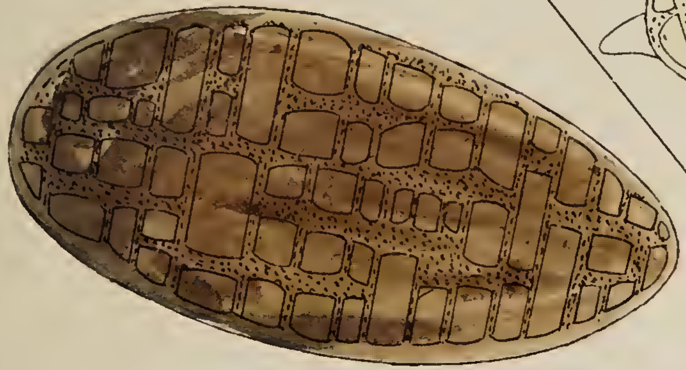
114.

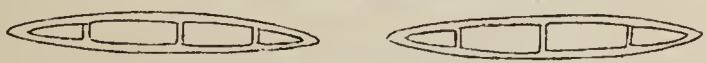

115.

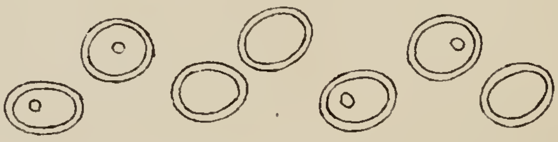

116.

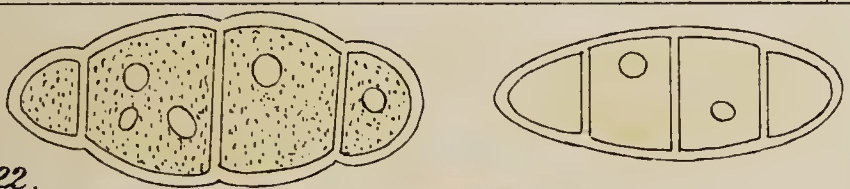

117.

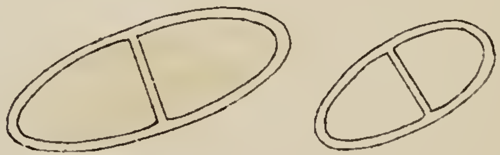

118.

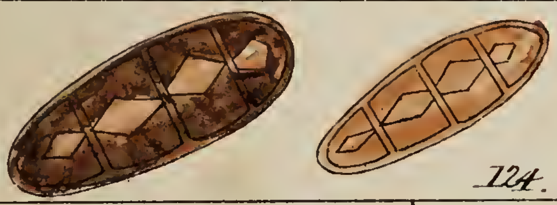

119.

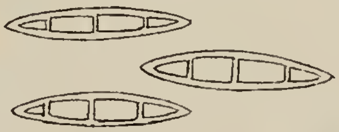

120.

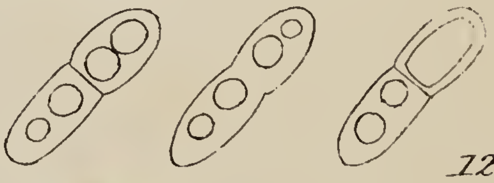

121.

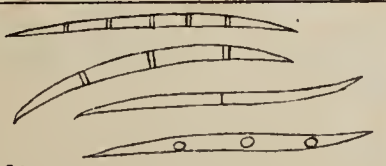

122.

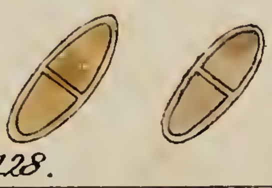

123.

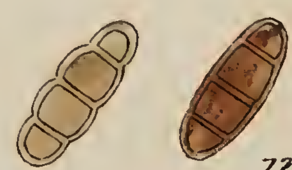

124.

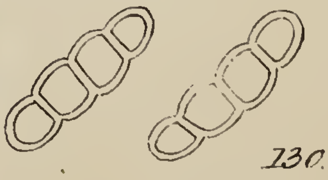

125.


126.


127.


128.


129.


130.

Wm Mudd. del.